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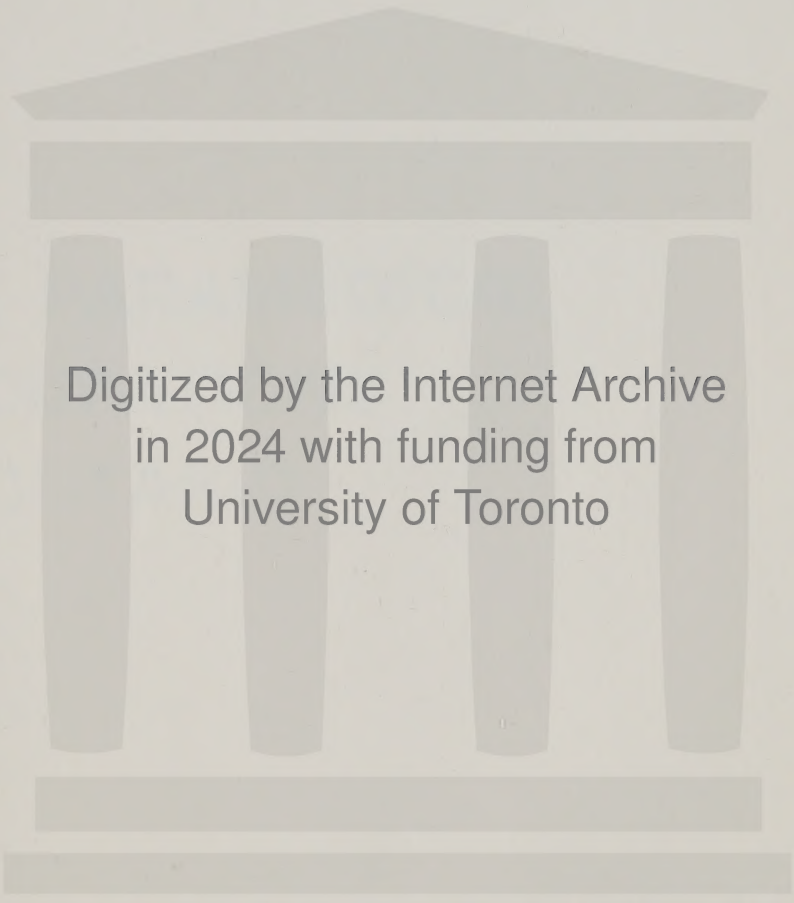

THE PARAMEDICAL OCCUPATIONS IN ONTARIO

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OSWALD HALL

A STUDY FOR
THE COMMITTEE ON THE HEALING ARTS
1970

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FOREWORD

The Committee on the Healing Arts was established by the Province of Ontario, Order in Council 3038/66, dated July 14, 1966.

In February 1967, the Committee commissioned Professor Oswald Hall, Professor of Sociology, University of Toronto, to undertake a study of the paramedical occupations in Ontario. The following is a study prepared by Professor Hall and submitted to the Committee in March 1968.

The statements and opinions contained in this study are those of Professor Hall, and publication of this study does not necessarily mean that all the statements and opinions are endorsed by the Committee.

I. R. Dowie, Chairman

Horace Krever

M. C. Urquhart

PREFACE

To the students of health care in modern society, three factors stand out. One is the rapid proliferation of specialized occupations, many of recent birth. A second is the growth of large organizations, particularly the general hospitals, as the places where healing occurs. A third is the rapid accumulation of scientific and technological knowledge in the field of medicine.

Other studies for the Committee on the Healing Arts have focused on the main actors in the health drama, the powerful and prestigious professions. This one tries to build up our knowledge of some of the less spectacular workers in the health field. Because they have grown up around the medical practitioners, they usually are referred to as "paramedical" staff. What they have in common is that they are a product of the modern hospital, and are intimately bound up with the problem of putting new knowledge to work in the hospital setting.

When the study started the number of occupations in view was small and manageable — fewer than a dozen. As the exploration went on it became clear that these occupations had subdivided and were subdividing rapidly. Moreover, new ones were emerging before our eyes as new technological possibilities arose. By way of illustration, although we began with the idea of *a* "laboratory technician", we found there were roughly forty variations of this basic occupation. While we were not able to give to each the detailed study it ideally deserved, we have been able to trace the main lines along which subdivision has occurred.

The study of each of the occupations has three viewpoints. In part the occupations are seen through the eyes of the people in them; and their views on their work, their careers, their fellow workers are shown. The occupations are viewed also through the lens of technology, in terms of the equipment and procedures that characterize each occupation. Then they are viewed through the perspective of organization — how they are organized, controlled, and supervised as part of the larger enterprise, the hospital.

O.H.

ACKNOWLEDGEMENTS

Since this was a study of occupations in their hospital settings, it made heavy demands on the patience and goodwill of a large number of hospital personnel. The main data came from five hospitals of varying sizes and styles of organization. Even if we had not promised anonymity to the people who helped us understand this feature of hospitals, it would not be possible to give credit individually to the hundreds of people who contributed their knowledge. The list of those who gave aid and encouragement includes administrators at all levels in the hospitals, medical personnel, receptionists and secretaries, as well as all the kinds of workers whose titles appear in the chapters of the study. Assistance was provided also by the Ontario Department of Health, the Ontario Hospital Services Commission, and the Ontario Hospital Association.

The study owes much to the energy and enthusiasm of three assistants, Diana Baxter, Margaret Larsen and George Torrance — sociologists all — as well as to the personnel of the Committee on the Healing Arts who typed, advised, and criticized with alacrity.

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Chapter 1 Introduction

The Paramedical Occupations

The paramedical occupations, taken literally, comprise all the occupations that have grown up around the "healing" practitioners. Defined in this fashion they include all people who offer help to the ill, including even the quacks and charlatans who operate outside the law.

A narrower definition restricts the term to those helping occupations that are part of the accepted framework of scientific medicine. In our day almost everyone accepts a single basic framework of practices and beliefs which we call "medicine". Healing by faith and magic still survive, but more and more such forms of healing are sharply distinguished from medical science and the art of medicine. In this context the paramedicals represent only the occupations that have arisen around the established medical profession in modern society.

A still narrower definition restricts the term to those occupations which are practised mainly within the hospital setting. This is a somewhat smaller group than the above, though still numerous. Not all of these have been included in the present study. Several have been given separate attention in preceding studies, particularly those which view themselves as professions in their own right.

Our analysis focuses on seven clearly recognized occupations and six that are newly emerging:

Laboratory technicians
Radiological technicians
Medical record librarians
Electroencephalography technicians
Electrocardiography technicians
Physiotherapists
Occupational therapists
Radio-isotope technicians
Inhalation therapists
Heart laboratory technicians
Assistants in the clinical investigation unit
Speech therapists
Rehabilitation nurses

Of the above, the first three are the most numerous. The first illustrates vividly the impact in the hospital of the explosion of scientific knowledge and the acceleration of technology. As will be noted later, it is already splintering into a set of distinctive subspecialties.

The people who follow these occupations work almost entirely in the hospital setting. In a very real sense the hospital generated them; now they are essential to its operation and survival. Most of modern medicine is possible only in the hospital situation.[1] The emergence of highly skilled expert medical specialists has been paralleled by the vast proliferation of technical equipment which is central to the modern hospital. This equipment, notably that in the x-ray departments and medical laboratories, could not function without a growing army of technical and technological personnel. Modern medical care requires that these personnel be harnessed to, and march in step with, the professional people in the hospital setting. It is in this fundamental sense that present-day medical care has become group medicine or team medicine.

The Hospital Setting in Ontario

The Province of Ontario has developed an imposing system of hospitals.[2] Some of these are rooted in the past and function largely to provide custodial care or convalescent facilities. But by far the largest part are active treatment hospitals, places of lively action as far as healing is concerned.[3]

The active treatment hospitals provide approximately 37,000 beds. On the average these beds are refilled every ten days. Together they represented in 1967 over a million hospital admissions. About one admission in eight was an expectant mother. The remaining seven-eighths comprised patients sufficiently ill that their doctors preferred to treat them in hospital rather than elsewhere.

Gradually the hospitals have taken on the stature of a very large industry. In 1967 the set of hospitals controlled by the OHSC provided over fifteen million days of care.[4] To provide this care the hospitals made use of over 100,000 employees.[5]

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[1]As Dr. Rutstein has noted, "During the final half of the twentieth century the hospital changed from a custodial institution to a complex workshop." D. D. Rutstein, *The Coming Revolution in Medicine,* MIT Press, Cambridge, Mass., 1967, p. 73.

[2]This is a dual system. Mental hospitals are under the Department of Health; other hospitals come under the Ontario Hospital Services Commission. A few of these hospitals are in private hands. These are on balance relatively small institutions. More than 98 per cent of the active treatment beds belong to a system of public hospitals. (See Annual Report, Ontario Hospital Services Commission, 1967.)

[3]All hospitals provide a great range of "household" services, plus related nursing services. Active treatment hospitals provide also a notable range of technical services. Active treatment beds comprise about 80 per cent of all beds in the hospitals controlled by the OHSC. The others, in order, are chronic care, convalescent, and psychiatric hospitals.

[4]Of these 15 million days of care, approximately 6 per cent were devoted to the newborn.

[5]Approximately 85 per cent of all employees are classified as full-time workers.

As noted earlier, hospitals utilize a great range of paramedical personnel who generally do not provide any direct service to the patient. Prominent among these are the people responsible for diagnostic radiological examinations. In 1967 in the public hospitals in Ontario, over 1,100,000 such examinations were provided, a figure slightly larger than the number of admissions to hospitals.[6]

An equally arresting figure concerns the number of units of laboratory service performed. For 1967 this stood at over fifty-eight million. Such an enormous figure is dramatic testimony to the vast technical and scientific armament that the modern hospital houses, and the fantastically large range of services and of paramedical personnel required to supplement the work of the modern medical practitioner.

Moreover, these paramedical services are currently the most rapidly growing dimension of hospital care. The number of patients admitted to hospitals has been growing each year at about the same rate as the population in general — about 3 per cent per annum. Radiological examinations for the period 1965-1967 have been increasing by 8 per cent per year. But laboratory services have been growing at more than twice this rate; for 1966-1967 the increase was over 18 per cent.[7] At this rate of increase the volume of laboratory services will double approximately every four years.

The technicians who man the radiology equipment and the laboratories are but two of many comparable occupational groups essential to the operation of the modern hospital. A catalogue of technicians would also include the helpers in electroencephalography, electrocardiography, blood bank, and inhalation therapy. Added to these are the people who keep the records of what is done for the patients' charts, for the administrators, for the organizations which finance the hospitals, and for those engaged in research. There are still others who are entrusted to carry out specified restricted services for patients, such as the physiotherapists and occupational therapists, whose work is sufficiently different from that of nurses to require a distinct set of titles.

Before we attempt to describe these recent arrivals on the medical landscape, it is useful to sketch briefly the main features of the hospitals which have spawned them and in which they work.

Scattered over the length and breadth of Ontario there are some 320 institutions bearing the name hospital. In total they have beds to accommodate over 70,000 patients.[8] These hospitals have grown in number and size as the population

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[6]Outpatient examinations were substantially higher — approximately 1,400,000 for the year 1967.

[7]The rate of growth of these services to outpatients is substantially higher. In 1967 the number of radiological examinations of outpatients was 15.5 per cent higher than in 1966; for laboratory services the increase was 31.8 per cent.

[8]See Canadian Hospital Directory, 1967, p. 13.

has grown; they reflect, too, its urban pattern. In general, they are concentrated in the heavily populated southern section of the province but, as noted later, this pattern of concentration is becoming increasingly complex.

The term "hospital" covers a broad range of health institutions, some expanding in importance and some declining. The pattern of hospitals reflects in a general way the state of the healing arts. Recent medical success in dealing with tuberculosis has resulted in the partial disappearance of hospitals devoted to this specific disease. Meanwhile, the attempts of medicine to deal with the mentally ill, and with those addicted to alcohol and drugs, have resulted in the addition of new hospitals devoted to these victims. In the course of time both of these activities have become part of the program of general hospitals also. The fate of hospitals is very much tied up with the state of the medical arts.

In terms of function performed, most of the hospitals fall into three broad classes. Currently the most significant are the general hospitals. These account for approximately 55 per cent of all the hospital beds in the province. Next in order are the mental hospitals, which account for 30 per cent of all hospital beds. The remaining beds, roughly 4,000, are spread among tuberculosis hospitals, convalescent hospitals and orthopaedic hospitals, in the order named. It is in the general hospitals, of course, that the paramedical personnel have proliferated most notably.

Ontario hospitals have grown up under a wide variety of auspices. Of the 320 institutions noted above, about fifty are in private hands. These are small institutions, providing about 1,700 of the 70,000 beds noted earlier. Another twelve of the 320 operate under the auspices of the federal government, providing a total of approximately 3,000 beds. Roughly three-quarters of these beds are found in the two Department of Veterans' Affairs (DVA) hospitals. Municipalities operate twenty-four hospitals, representing approximately 6,200 beds. The Government of Ontario operates twenty-six hospitals, which together provide roughly 20,500 beds. Of these beds almost 90 per cent are in mental hospitals. Religious organizations operate fifty-three hospitals with a total of approximately 12,500 beds. The remaining 155 hospitals are operated by lay bodies, usually voluntary corporations. These represent some 25,000 beds and hence are the largest category in terms of both numbers of institutions and numbers of beds.

The lay hospitals and the religious hospitals are predominantly general hospitals. Eighty per cent of the beds they provide are in hospitals of the general type. They all but monopolize this category of hospital — of the total of 38,000 beds in general hospitals, approximately 30,000 are in either lay hospitals or religious hospitals.

Hospitals vary widely in size. Mention has already been made of the fact that

the province operates the mental hospitals. These are large; in the twenty-six institutions so categorized there are over 19,000 beds. So too are the federal hospitals; among these, the two DVA hospitals represent about 90 per cent of the 3,000 plus beds in operation. By contrast the private hospitals are generally very small institutions.

It is among the general hospitals that one finds the greatest range of sizes, however. Some of these have fewer than ten beds, while some have over a hundred times this number.[9] There are eighteen hospitals with more than 500 beds each, which together represent over 14,000 of the total of 38,000 general beds. At the lowest level there are about ninety-two general hospitals with fewer than 100 beds each, representing approximately 4,600 beds with an average of fifty beds each. In between are a set of hospitals ranging from 100 to 499 beds; these number eighty-seven and together account for approximately 20,000 beds.

As might be anticipated, the size of the hospital tends to correspond to the size of the community in which it is located. Thus at the upper level we have a set of metropolitan communities in which the very large general hospitals are situated. The smallest hospitals are characteristic of the distant hinterland. In between are relatively large urban communities with medium-sized hospitals.

All these hospitals tend more and more to constitute a system in which they become related to one another in a web of interdependence. The large ones usually become progressively more specialized. Insofar as this is the case, patients may be referred from the smaller hospitals to the larger. In reciprocal fashion, some of the specialized staff of the large metropolitan hospitals perform services for smaller hospitals. This occurs between small and medium-sized hospitals, and between both of these and the larger ones.

In fact, as a result of this reciprocity, one can detect a move towards the development of a regional hospital system. Hospitals are encouraged to lean on one another for various services, rather than to compete to produce them. In many parts of the province regional hospital councils are emerging which formally link rural to urban hospitals and both to metropolitan hospitals.

The interweaving of hospitals into a system proceeds also along another axis. The major clusters of metropolitan hospitals tend to develop around the medical schools of the province. The schools are able to supply the hospitals in their orbit with the most highly specialized kinds of treatment personnel. By the same token, the hospitals provide the medical schools with an essential element — a

[9]The Toronto General Hospital exemplifies the large metropolitan general hospital. It comprises 1,277 beds plus 128 bassinettes. During 1967 it admitted over 27,000 patients. Its personnel number almost 3,500; its annual budget is nearly twenty-four million dollars.

large range of varied types of illness for the clinical training of young doctors. As a result of these two processes, the metropolitan hospitals tend to grow in size and to provide ever more refined sorts of specialized services.

In the course of time, the province has developed major regional centres of teaching hospitals stretching from Ottawa in the east to London in the west. With the development of the Hamilton centre Ontario will have a set of five centres, providing the east-west axis of the province with a series of well-articulated systems of hospital care. In each of them a health sciences centre will be integrated with a system of teaching hospitals. These — mainly large general hospitals — will be linked in the ways noted above with the medium-sized and smaller hospitals that spread out into the hinterland of each metropolitan region.

The centres have received official formal recognition by the provincial government, which has decided to take over the total cost of construction and renovation of the facilities to be used as teaching hospitals and research institutes. The result of such policies will be a province-wide network of medical schools, research institutions, and hospital facilities interwoven into unified regional systems.

Thus, we can see the emergence of a highly organized system of hospitals. The hospitals form a system in three related but distinct senses. First, they are the means for providing both highly specialized and relatively simple medical care for a population spread over a wide area. Second, they are an integral part of a system of medical education; it is in them that the major part of the time of the medical student is spent. Third, they are an integral part of the framework within which medical research is carried on. Each of these facets of the hospital (service, teaching and research) tends to reinforce and strengthen the others.

The Structure of the Hospital

As the general hospitals have grown in size they have become more specialized and complex. Their structure has been elaborated along three lines. They have generated separate departments to provide the differentiated services which specialization makes possible. They have built up a substantial system of administrative and professional controls. And they have generated a vast range of supporting and helping personnel to supplement the work of professionals and administrators.

Departmental Specialization

Hospitals range in structure from very simple small unitary models to those organized into many medical departments of the sort associated with medical schools in metropolitan communities. The specialized medical departments reflect the division of labour among doctors. As the body of medical knowledge has expanded and the ways of applying it have multiplied, its practitioners progressively

have identified themselves with specialized fragments of knowledge. As these fragments have become autonomous, and as the tools of the trade associated with them have become more costly and complex, they have tended to find a place in the framework of the general hospital.[10]

Highly developed general hospitals on the Ontario scene may display as many as twenty medical departments, as follows:

Anaesthesiology
Bacteriology
Dermatology
Internal medicine
Neurology
Neurosurgery
Obstetrics and gynaecology
Ophthalmology
Orthopaedic surgery
Otolaryngology
Paediatrics
Pathology
Physical medicine and rehabilitation
Plastic surgery
Psychiatry
Radiology-diagnostic
Radiology-therapeutic
Surgery — general
Surgery — thoracic and cardiovascular
Urology

The high level of specialization is a relatively new phenomenon, but its end is not in sight. Already many fragmentations are occurring on the fringes of established specialties. Moreover, recent technological developments, such as those associated with uranium, may generate whole new departments like that of "Nuclear Medicine".

The existence of these departments within the hospital has some important consequences, of which three deserve attention. They compete for scarce resources in the hospital, notably space, nursing and technical facilities, and a place in the budget. They require a formal system of records to keep track of their multitudinous activities and interconnections. They also necessitate some system of administration to achieve an appropriate level of coordination among the various specialties.

Administrative Organization

Large organizations tend to develop a departmental structure. Each main function of a big organization tends to become a department in its own right. Hospitals are no exception. In them, departmentalization has proceeded to a high degree; moreover, administrative departmentalization supplements technical specialization.

Departmentalization goes much beyond the medical specialties discussed earlier. The hospital is a household as well as a medical institution, and the household functions become specialized into departments. Housekeeping subdivides

[10]On occasion these fragments of knowledge tend to be incorporated into special hospitals in their own right. Thus paediatrics may become the concern of a children's hospital; psychiatry may generate its own hospitals, and so on.

to the point where the laundry and kitchen become distinct entities, as do maintenance and plant and planning. Purchasing and accounting and finance separate into distinct departments. Personnel relations and public relations become distinct entities. Nursing services and social services become relatively autonomous. Pharmacy, radiological services, and laboratories emerge either as facets of medical specialization or as close supports of medical care. A department of medical records emerges which parallels the other systems of records required to maintain order in such a complex system.

The development of all of these specialized activities in the hospital requires a controlling system of supervision, direction, and coordination. As in other large organizations this implies supervisory personnel, directors of each of the specialized departments, and some over-arching general functionary to superintend the total enterprise.

In simpler hospitals this latter function frequently was an extension of the work of nursing; the superintendent was the "matron" of the hospital. As a nurse she was decidedly subordinate in status to the doctor; as administrator she was equally subordinate to the medical personnel of the hospital. In large hospitals the superintendent is likely to be a specialist in hospital affairs; he comes to be viewed and labelled as an administrator rather than a superintendent. The training of such people becomes a matter of specialized programs, embedded in medical schools or elsewhere in the universities. The post of chief administrator of a large hospital is one of substantial responsibility. He is in charge of an enterprise whose employees are numbered in the thousands, and whose budget runs into millions of dollars. On him falls the final responsibility to organize and coordinate the various specialized activities noted above.

The role of the hospital administrator resembles in many ways that of the chief executive officer of other large public and private bureaucracies. But one special feature makes the hospital a distinctive organization. The administrator exercises almost no control over the day-to-day working of the various medical departments of the hospital. The doctors in these departments are subordinate, not to the superintendent, but to their own chief. The hospital has developed a *dual* pattern of authority.[11] It is not, therefore, a "line" organization in the classic sense. From this basic feature there spring many anomalies of organization. For example, nurses are hired by the hospital administrator and supervised by head nurses; nevertheless they carry out doctors' orders in much of their daily work. There is no corresponding sense in which doctors carry out the administrator's orders. This is not to say, of course, that doctors are individually

[11]H. Smith, "Two Lines of Authority: The Hospital's Dilemma", *The Modern Hospital*, March 1955.

autonomous in the hospital setting. Within the pattern of organization, doctors are rigorously controlled.[12]

It is not possible here to consider in detail the total structure of the hospital. The remarks following are restricted almost entirely to the structure of the medical departments and the paramedical departments.

Organization of a Medical Department

A medical department of a hospital is an anomalous organization. In one sense it is a set of competitors all struggling for the same set of clients. In another sense it is a set of cooperating colleagues working for the welfare of the patient in the hospital. It also is a set of autonomous professionals who are somewhat unwilling to be subordinate to a board of laymen which, in part, controls them through the office of the hospital superintendent.

Nevertheless a medical department functions relatively effectively. It manages this partly by subordinating its members to the chief of the whole medical staff of the hospital. It surmounts many of its problems through a system of watchdog committees, some of which embrace the superintendent and the governing board of laymen as well as medical personnel.

Within the department one notes three distinct categories of doctors. The major group is comprised of the attending doctors who have the privilege of admitting patients to hospital beds and utilizing the equipment of the hospital. A second group, with more prestige but less power, is the consulting doctors. These are men of marked reputation in the community who can be called on for assistance in difficult cases. A third group has courtesy appointments; these doctors may, under special conditions, make use of the hospital facilities, but have no powers of decision-making. Organizational power and responsibility rest with the attending physicians.

The attending staff is stratified into six distinguishable layers. At the top stands the chairman; in a university-affiliated hospital he may be a senior academic. Below him are three levels of colleagues designated as attending physicians — seniors, associates and assistants. At a still lower level are the residents and fellows, who hover in status between the interne and the fledgling doctor. At the bottom are the internes; they have concluded their medical school training but are not yet permitted to practise medicine.

Internally, the component medical departments of a hospital are finely graded systems of power, prestige and responsibility. To function effectively the members

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[12]Since doctors are in vigorous competition with one another for patients' fees, and since they frequently build up cosy informal "group" practices, the problems of their control in the hospital are complex to an extreme degree.

at each level must be highly knowledgeable about the duties and privileges appropriate to that level. Moreover, the system is not a static one; doctors are shifted periodically from lower to higher levels, and occasionally, under unfavourable circumstances, shifted downward or outward. When doctors are moved in the hierarchy, or newly introduced to it, they may occupy a provisional status for a considerable time. The actual structure of the on-going department is, therefore, somewhat more complex than the six-layered model just presented.

A medical department is readily distinguished from the non-medical sections of the hospital in terms of its organizational form. Its members tend to view themselves as individualists, each going his own way to do what is required for his patients. Each sees himself as autonomous, and not subordinate to the commands and orders of another. Each views himself as standing intrinsically higher than any layman, even though laymen stand at the pinnacle of the hospital.

In the extreme case, the members of the medical staff are fiercely sensitive about their autonomy as the providers of medical care; they are keenly attuned to any threat of trepass from those around them; and they are highly jealous of their property rights in their patients. Such men do not fit into the hospital without stress and strain. It is this strain between two forces of organization that Myers has in mind when he states:

> Liaison between the medical staff and the governing board and its agent, the administrator of the hospital, is an absolute essential to prevent or reduce the hospital-physician conflict which frequently afflicts the hospital. This conflict is the inevitable result of the illogical, jerry-built organization which characterizes most hospitals.[13]

Paramedical Departments

The term "paramedical departments" as used here covers three differentiated kinds of activities in the hospitals. The most numerous group of workers covered is the technicians who man the laboratories and other diagnostic facilities of the hospital. Next in numerical importance are various kinds of therapists, who provide for patients certain services which lie on the margin of those provided by doctors. The third group provides clerical services, handling those hospital records which are distinctively medical in character.

The divisions among these groups are not crystal clear, as is so often the case among many of the other classes of workers in the hospitals. In many cases, it is far from easy to distinguish between any pair of such matters as medical services, forms of paramedical therapy, personal services, technical services, and clerical services. The service categories tend to blur at the edges. The hospital is a going concern rather than a neat system of logical categories. This is at once

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[13]See R. S. Myers, "Organizing the Medical Staff" in J. K. Owen, *Modern Concepts of Hospital Administration,* Saunders, Philadelphia, 1962, p. 196.

evident when one turns to the case of the medical record librarians. On one side, they are distinguished from, but related to, the medical librarians who also function in the hospital; and on another side, they are distinguished from, but related to, all the clerical staff who handle the financial, personnel, or other records for the hospital.

The paramedical departments stand somewhere between the strictly administrative departments and the medical departments discussed earlier. They have a relatively high degree of autonomy in pursuing their objectives. To a large degree they are self-policing, and are not supervised directly by the administrative staff of the hospital. They do not, however, have the ultimate type of professional autonomy characteristic of the medical practitioners. Typically, they may be headed either by a medical man or by an administrative assistant. Some are headed by a doctor with a flair for organizational work; others by an administrative official with special technical competence.

A noteworthy feature of the most advanced paramedical departments is the role of scientifically or technologically trained personnel who stand between the administrators of the department and the workers who do the technical jobs. One finds chemists, biochemists, physicists and other academically trained personnel who function in large part to improve or modify the technical programs currently under way. These people are distinguished not so much for their "know how" as for their "know what". A substantial part of their work is the continual creation of new kinds of "know how", which in turn requires either new kinds of technicians or the retraining of those currently on the job.

The formal structure of the paramedical departments reflects four levels of personnel:

Chief — an administrative figure (technician, doctor, or Sister);
Scientific and technologically trained workers;
Supervisory staff — charge technicians and head technicians;
Technicians — various grades, some of them learners.

It is worth noting that to a large degree the paramedical departments are made up of layers of workers that are markedly dissimilar in status. The technical people and the technologically trained people are recruited and educated in very different ways. Similarly, the doctors and nuns at the top represent very much closed groups. These departments are almost classic examples of structures that block the mobility of those at the lower levels. This is in marked contrast to the medical and nursing departments which have clear channels of upward movement for the recruits entering them. The inability of staff to move upward in a paramedical department influences the matters of recruitment, training, morale and turnover in very substantial ways.

Subspecialization in Paramedical Departments

Among paramedical departments a process of specialization goes on similar to that noted among medical specialties. The growth of scientific knowledge and the increase in technological expertise combine to give a specialized push to the paramedical departments. This is particularly noticeable in the case of the large metropolitan general hospitals.

In relatively small hospitals there is little evidence of such developments. In them, for example, the laboratories are often only slightly specialized, as the technicians tend to rotate freely from one kind of work to another. The technicians in smaller hospitals are generalists rather than specialists. Moreover, all of the varied responsibilities of the laboratory fall under the control of a single head, either a technically trained or a medically trained person.

In the larger metropolitan hospitals specialization is evident in terms of both technical and organizational matters. On the technical side the hospital laboratories subdivide into separate entities. The commoner candidates for special status are

Bacteriology	Cytology
Biochemistry	Haematology
Blood Bank	Histology

Each tends to become a distinctive specialized laboratory. These specialized laboratories may all fall under the direction and control of a single central director, or they may become almost entirely autonomous, only nominally responsible to a central director.

Whether autonomous or coordinated, the laboratories develop an elaborate administrative scheme. In the larger hospitals the system is comprised of the following sorts of functionaries:

1) Medical director
2) Chemist, bacteriologist, haematologist (university science graduates)
3) Technical or administrative director
4) Assistant technical director
5) Charge, head, or chief technician
6) Assistant charge technician
7) Senior technician
8) Intermediate technician
9) Junior technician
10) Student technician
11) Assistant technician
12) Technician's aide

To these should be added the part-time technicians, night workers, and summer students who perform a necessary role by relieving in the off-hours and off-seasons.

The dozen categories listed above do not form a tidy chain. Some classes of workers are performing roughly similar tasks, as in the case of 7, 8 and 9. Nonetheless it is clearly noticeable that each of the four functions discussed earlier — direction, the use of scientific knowledge, supervision, and technical tasks — has been elaborated substantially. Both the technical specialization and the specialization of organizational form are relatively recent developments in hospitals; there is no sign that their growth will be arrested.

Further Specialization of Paramedical Workers

One other aspect of specialization deserves comment. There appears on the horizon a finer subdividing of tasks previously performed by a general technician.

Thus, among the biochemistry laboratory technicians one can detect five distinct subdivisions. New machines like the autoanalyser generate special workers. Others arise around the development aspect of new methods. Still others emerge from the expansion of the field of biochemistry. In each of the fields of bacteriology, histology and haematology our field work uncovered two more highly specialized technicians working beside the general technical personnel.

Our research documents a progressive elaboration of technical expertise as hospitals increase in size. In the small hospitals the laboratory technician is generally competent to handle all the laboratory tests. In more complex hospitals the laboratories themselves become specialized. In the case of the most highly developed hospitals even the personnel of the specialized laboratories become subspecialized.

The Research Design

We selected five hospitals across the province for close study. They represent the range of general hospitals to be found in Ontario — from the large metropolitan general to the small 200-bed general in a central Ontario town.

Hospital A is a 600-bed hospital in Ottawa with Roman Catholic affiliation.

Hospital B is an 800-bed metropolitan general in Toronto with no religious affiliation.

Hospital C, the largest, is a 900-bed Catholic-affiliated hospital, also in Toronto.

Hospital D is a 300-bed general hospital in a northern Ontario city. It is a Catholic affiliate.

Hospital E, the smallest, is a 200-bed hospital in a small central Ontario city. It has no religious affiliation.[14]

[14]An elaboration of some aspects of these hospitals is found in the Appendix.

The data for the study came from four sources.

1) We first approached a number of knowledgeable people in hospitals, mainly chief administrators. Among these were the five administrators of the main hospitals selected for detailed consideration.

2) The second source of data was the group of supervisors of the various departments who were in charge of the paramedical personnel. Some of these were doctors; some were the Sisters in Catholic hospitals; and some were technical personnel who had climbed to positions of supervision. These interviews were more highly structured than were those with administrators.

3) A third source was the workers themselves. In each hospital a representative group of each paramedical occupation was interviewed. A standardized interview schedule was used for each subject, supplemented by an assessment by the interviewer.

4) In each department anonymous questionnaires were distributed, in the hope that all the paramedical personnel (including those interviewed) would fill them out. These provided standardized information about each worker — age, sex, education, training, and so on. The response rate was virtually 100 per cent. Approximately 260 paramedical personnel completed and returned questionnaires. These constitute the core of our study.

From these four sources, the study derived four main kinds of information:

1) The central body of data concerned the actual on-going work performed by the worker in the hospital setting. Such information revealed the magnitude of the group in the total enterprise of the hospital and gave clues to the significance of the occupation in question. As far as was feasible (given the varying kinds of ignorance of the interviewers) information was secured on the specific techniques employed by each worker. Additional information was sought on the degree of subspecialization occurring within the occupation, and on the question of whether workers were starting to subspecialize or were encouraged to handle all facets of their occupation.

   In this context information was gathered on the actual formal organization of each department. Such data revealed whether the occupation could be used as a stepping stone to an administrative or supervisory position, or whether the actual supervision and direction were the prerogatives of a distinctly different occupation.

In some cases it was clear that supervision was the preserve of a religious order, and that the ordinary recruit to the occupation could never aspire to an administrative post if he or she remained in that hospital.

As a final item here, information was sought on the occupational associations to which the worker belonged and on their relevance to him. Since these associations can function in collective bargaining, as well as in training and control, it seemed essential to discover how important their members considered them.

2) A second body of data dealt with the recruitment of paramedical workers and their social origins. We sought to discover to what degree these occupations belong to women or to men, and at what age, and with what levels of schooling people enter such occupations. Do the women continue in the occupation after marriage, and/or do they return to work after their children are raised? Is there a place in the occupation for the older unmarried woman?

Other information was sought on the socio-economic background of recruits, notably the occupational level of their fathers and of spouses of the married. Supplementary data were gathered on the incomes of the workers and their spouses.

Questions were asked regarding the origin and language of the recruits. Some of the occupations draw heavily on Canadian-born and Canadian-trained recruits, while others draw on European sources. In other cases the supply comes largely from Oriental sources. Some come with supplementary languages; others have a meagre command of English.

3) Information on the training of the paramedicals falls into two main categories. Much of the training is organized into formal courses of instruction, but some is learned more or less informally on the job. The same observation applies to the various kinds of advanced training available for the members of any occupation.

4) The final type of data concerns the actual careers of the members of the paramedical occupations. How long do the members remain in the occupation in question? How long do they remain with a specific employer? Detailed information was sought both on job sequences for the members of these occupations and on the career expectations they verbalized. To supplement information supplied by the workers, complementary information was sought from the supervisory staff regarding policies aimed at retaining such personnel.

Chapter 2 Laboratory Technicians

Numbers and Importance

The laboratory technicians are the largest and fastest-growing group of hospital-based paramedical personnel that we studied. In the hospitals of our sample there were 131 laboratory technicians, comprising over half of the total paramedical staff. According to our findings they are also the highest in demand and the shortest in supply. Aside from nurses, it is this group that provides the hospitals in Ontario with their most critical paramedical manpower problem.

Laboratory technicians also are the most significant occupation in terms of the proliferation of new specialties. Although the pace of change in most of the other paramedical fields is quite rapid, it does not match that of laboratory technology. While a decade ago most hospitals used the same few technicians to perform the whole repertoire of tasks in pathology, histology, haematology, biochemistry and bacteriology, now all the larger hospitals employ different specialized personnel to provide the greatly expanded services in each of these fields. Indeed, specialization has reached the point where one technician may perform only one precise task within each of these specialized laboratories. The electron microscope technicians in the pathology laboratory are a case in point.

Clearly, this extreme specialization requires a long intensive training on the part of the technician. Until recently the arrangements for training laboratory technicians were makeshift and various. Before OHSC certification procedures were introduced, each hospital set its own standards for recruitment and training. In some instances excellent training programs emerged. In others, the training was casual. Whatever the quality of these previous programs, it has become increasingly apparent that they are inadequate to meet the staffing needs of today's hospitals. Over the last few years the hospitals have had to rely on a number of expedients in order to meet the serious shortcomings of the old training methods.

One of the most significant of these is the utilization of foreign-trained personnel. A large number of Ontario hospitals are now dependent on the airlift as a mode of recruitment. Without the influx of trained technicians from the Philippines and other countries, many of these hospitals, particularly in the smaller communities, could never have provided these vital services. In our sample of laboratory technicians, 43 per cent were born outside Canada. If Ontario is to become independent of these sources of supply, substantial changes will have to be made in the domestic training program.

Organization of the Hospital Laboratories

The hospital laboratories have come a long way in the last two decades. Their transformation has been an integral part of the general transformation of medical practice, and of the role of the hospitals as discussed in the introduction to this study. They started out as small service units in which a few generalist technicians performed a number of simple diagnostic tests at the request of the attending physician. In the larger hospitals, the laboratories were headed by a full-time pathologist, but the main burden of supervision usually fell on the shoulders of the chief technician, typically a man of slight education but long experience in the laboratory.

Over the last two decades the laboratories have grown enormously in size and complexity. For example, in 1937 in Hospital A, the entire laboratory consisted of one pathologist and three girls, none of whom had finished high school. Now there are fifty-five technicians spread over seven laboratories.

There are a number of reasons for this expansion. One of them has been the constant increase in the number of beds in the hospital and the increased utilization of beds resulting from the shorter stay of many patients. Another more important reason is the accelerating pace of scientific and technical advance. Not only has medical science discovered more about the nature of disease, but developments in chemistry and biology have provided new diagnostic tools for medicine. The result has been a vast increase in the range and sophistication of laboratory testing. As these developments become applicable, they are incorporated into the standard arsenal of hospital tests. The hospital laboratory is replacing the doctor's office as the place where diagnosis is made. A third factor in the expansion of the laboratories has been the introduction of medical insurance schemes which removed the financial burden for these expensive procedures from the pocketbook of the individual patient. A fourth factor is a subtle shift in the nature of diagnosis; now doctors may order a whole battery of tests indiscriminately, rather than the one they feel is really relevant — "just to be on the safe side".

This expansion in the overall size and internal technical specialization in the laboratories has had important consequences for their organization. In the larger hospitals, what had once been one general-purpose laboratory developed into a number of semi-autonomous laboratory departments. As specialized medical and technical personnel were brought into these different departments, the autonomy of each laboratory increased. Within each department, casual, personal supervision no longer sufficed; an explicit chain of command, responsibility and communication was necessary to control the work of the large and diverse staff. Precise work schedules and a division of labour among the technicians had to be devised to handle the increasing work loads. In short, modern methods of administration had to be applied.

The following section will present a detailed picture of these laboratories as they appear today. First, a brief description will be offered of the various specialized fields which constitute modern medical laboratory science. Second, the flow of work will be described as it typically occurred in the laboratories on our sample. Third, a note will be made of the different structures of authority, supervision and control in the laboratories. Finally, a listing will be made of the various categories of specialized personnel employed in our sample laboratories.

Specialized Fields of Hospital Laboratory Technology

The following seven fields[1] are the most common divisions in the hospital laboratories. Basically, these different specialties have been in existence for some time as separate areas of hospital laboratory science. Some, however, have come into prominence only in the last few years as new applications have been developed. A case in point is the great expansion of laboratory services in cytology accompanying the widespread introduction of the smear method of cancer testing. The following provides a capsule description of what is done in each of these different fields.

Bacteriology

This science investigates the presence, character and effects of living organisms within the human body. These include bacteria, fungi and parasites. Some laboratories also study viruses. Specimens of urine, feces, blood and other materials are obtained from the patient. These are "planted" in a medium which is favourable to the growth of micro-organisms, then placed in an incubator which provides the ideal growth temperature. After a certain period of time they are removed and the resulting cultures are examined by the naked eye and/or microscopically for the presence of living organisms. If a positive identification is made, subsequent tests are conducted with various antibiotics to determine the sensitivity of the bacteria. Rare findings are sent to the provincial laboratories.

Biochemistry

This is the largest, most complex field of laboratory technology. Basically, it involves the search for pathologies in the biochemistry of the human body. Specimens of blood, urine and other *body* substances are obtained from patients, and chemical analyses performed on them. Most of the tests are highly standardized. The development of automatic machinery, notably autoanalysers, has revolutionized procedures in this field. These machines perform a highly complex sequence of operations on a large number of samples and automatically chart the results. In addition to the routine tests, however, there is still a large body of work which must be done by hand.

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[1]Electrocardiography, medical photography, and electronics are names given to certain activities which are too marginal to be considered as "fields".

Blood Bank

The basic technical tasks here are the determination of the exact blood type of a sample taken from a patient. This blood is then cross-matched with that from blood donors to determine compatibility. Subsequently, transfusions may be carried out, using the cross-matched blood. Aside from routine blood typing and cross-matching, special investigations are sometimes made into rare blood types.

A major aspect of this work involves prenatal tests. Blood from expectant parents is tested in order to anticipate blood peculiarities in the child.

Some blood banks have intravenous nurses associated with them whose job it is to collect samples and conduct transfusions.

Cytology

This field studies tumors and other body materials for the presence or absence of malignant cells. Smears and tissue sections are examined microscopically and the constituent cells identified.

Haematology

Microscopic studies of blood are carried out in order to count and identify the kinds of cells which it contains. Blood samples are taken from the patient and centrifuged to separate the different constituents. Fluctuations in the count of cells are diagnostic evidence of the existence of infections and diseases such as leukemia and anaemia.

Histology

Histology is the study of pathologies in body tissue. Specimens of tissue are obtained from the patient, usually during surgery or from autopsies, frozen so they can be sliced into microscopic sections, mounted on plates, and examined under a microscope. A new subfield is electron microscopy, which permits investigation at the subcellular level. The technicians do not, in most cases, make identification from the slides. Their job is to prepare a high quality slide which is then examined by the pathologist.

Routine of Work in Some Typical Laboratories

The aim of this section is to present a realistic description of the flow of work and the pattern of supervision among the various groups of specialized laboratory personnel in each of the different laboratories in the hospital. In short, we shall view some typical daily laboratory operations. Where there is a glaring exception to the typical pattern, it will be given special mention. The matter of control and responsibility will receive particular emphasis.

The Central Office

In the two largest hospitals in our sample, each laboratory has a substantial degree of autonomy and there is no central office for all the laboratories. In the three smaller hospitals, however, some kind of central office exists. Typically, this unit contains the offices of the technical director, several secretaries, a receptionist and in some cases a receiving bench. A room for obtaining specimens from outpatients is sometimes included. In the case of hospitals run by religious orders, the technical director is usually a nun. Her duties are primarily administrative and budgetary, although she may be a technical supervisor as well.

The functions of the central office in the smaller hospitals involve the receipt of all samples and requisitions for tests, their allocation to the proper department, and the recording and sending out of the results. In the larger hospitals each laboratory makes its own arrangements for this. In hospitals with a central office and a technical director, a further check is thus made on the accuracy of the results in addition to the check made by the charge technician in a particular laboratory.

Bacteriology

Typically, the bacteriology laboratories consist of one large room filled with benches holding various kinds of apparatus, plus separate offices for the bacteriologist, a secretary and the charge technician. Some laboratories have a separate room for infectious disease tests, especially tuberculosis tests. Refrigerators, incubators, bell jars and microscopes are placed around the main room.

In a typical case an attending physician fills out a requisition for a test. Sometimes the sample or specimen is included with the requisition; sometimes it must be obtained from the patient by a ward nurse, an interne or a technician. The samples comprise sputum, feces, blood and parasites. All the requisitions and specimens come to the laboratory office, where they are recorded in a day book and given a number, by either a technician or a secretary.

Most of the tests involve bacteria. Typically, each bacteriology laboratory has one or more assistants whose job it is to prepare the media in which the bacteria are cultured. One or two technicians are assigned to the job of planting the samples in plates of media and placing them in an incubator. At the time the culture plate is prepared the technicians take a smear from the specimen and examine it under a microscope. From this examination they can tell generally what the bacteria looks like but they cannot make a precise identification. Most cultures are sufficiently developed overnight, but some require a longer incubation period.

At the end of each day the supervisors assign each technician an equal number of specimens to work with the following day. Usually this job is assigned on a

rotating basis for a period of two or three weeks. The head technician makes up the rotation schedule but does not allocate the work on a day-to-day basis. Most bacterial growth can be identified by the naked eye. Tests are then conducted to see if the organism is pathogenic. Some of these tests take a long time—up to a week. Indeed, T.B. cultures must be examined once a week over a ten-week period. Some require further identification by microscope. Uncertain cases are usually referred to the head technician or the bacteriologist.

When a positive identification of a pathogenic bacterial culture has been made, tests are conducted to determine which antibiotics would be effective in combatting it. These are called "sensitivities". A tablet containing the antibiotic is placed in the culture and its effects observed. The technicians record their findings on a work slip. The head technician and the bacteriologist check these forms for errors and omissions. If found deficient, they are sent back to the technician. When completed, the slip is passed to the laboratory secretary who types the results on the requisition forms. The typed forms are then re-examined by the head technician or the bacteriologist, and sent out to the wards where they are affixed to the patients' charts.

Most bacteriology departments conduct periodic checks of the hospital facilities to help control infections. Technicians gather samples in the kitchens, on the wards and from the personnel, and perform the routine tests on them. Although this job is very important, it occupies only a small proportion of the laboratory's time. At a maximum, one technician may work full time on this; at a minimum, it may involve the work of one technician one day a month.

In the bacteriology laboratories there is little teamwork in the sense of several technicians working together in a tightly coordinated fashion on a single task. Planting specimens, reading microscope smears, and identifying bacterial growths are individual tasks.

There also is little contact with people outside the laboratory. Samples are collected from the patient and brought to the laboratory by nurses and orderlies. Occasionally a doctor or interne may telephone or visit to check the results of a test. There is little opportunity for the technicians to develop a sense of direct participation in the process of healing an individual patient.

In the bacteriology department the most common danger of error is that of mixing up the numbers of tests—the results of one test may be recorded under the number of another specimen. The technicians are acutely aware of this danger and act carefully; the double-checking by the head technician or bacteriologist provides an additional safeguard. Aside from this, few mistakes are possible. Most identifications are relatively simple; uncertain cases are referred to the more qualified staff. Ultimate responsibility for the accuracy of the results rests with the bacteriologist.

It should be noted that not all hospitals have a full-time M.D. or even a university-trained bacteriologist on staff. In these instances the responsibility rests with the head technician and then with the medical director of the laboratories.

Biochemistry

Physically, the biochemistry laboratories resemble the bacteriology laboratories except that they are usually larger, occupying two or more large, bench-filled rooms. Notable features of the landscape are the autoanalysers, large complicated machines which take up considerable bench space.

As in bacteriology, the work originates with the attending physician who fills out a requisition for a test. The nurses or internes obtain the samples from the patient, usually blood or urine. The requisitions and samples are brought to the laboratory office by a nurse or an orderly from the different wards. In some hospitals, the biochemistry technicians themselves go to the wards to collect the samples from the patients. In Hospital D the technicians collect the blood samples, while the nurses obtain the urines and spinal fluids and bring them to the laboratory office. There they are registered in a day book and assigned a number, by either a secretary or the head technician.

The blood samples are given to the technicians who have been assigned for this rotation to the job of centrifuging. After centrifuging the blood components are taken to the different benches for the appropriate tests. Non-blood specimens are usually taken directly to the appropriate benches. The more common tests include: liver function, urinalysis, blood sugar, electrolytes, hormones and steriods, BUN's (blood urea nitrogen), calcium and phosphorus, bilirubins, proteins, and electrophoresis. Usually there are at least five separate benches where these tests are done. Technicians generally rotate to a different bench every three weeks or so.

For many technicians, the first task each morning is the running of control tests. The head technician prepares and hands out control solutions. The technicians perform tests with these solutions and note the results. If the results fall within an acceptable range, it is assumed that the reagents and the machinery are in order. If they are outside this range, additional tests are conducted to locate the source of the error.

The main bulk of the work consists of BUN's, blood sugar and urinalysis. In most of the laboratories, the former two series of tests are automated. A number of samples are fed into autoanalysers, which perform a sequence of operations. The analysis is plotted automatically on a graph. At the end of the run, the technician performs computations from these graphs to obtain the final results. According to our interviews, the calculations are a potential source of error, because at the end

of the day the technicians suffer from "autoanalyser fatigue" and are not as alert as they might be. This source of error will disappear when the calculation process is automated to give a print-out.

At the end of the day the work slips are handed in to the head technician, who checks them. Or the results may be recorded directly in the day book and then checked by the head technician. Several checks are conducted. Finally, the results are typed on to a form, rechecked, and sent to the wards.

As far as we could determine, there is little teamwork in the biochemistry laboratories. The work is more of the assembly line sort, where each technician works independently to complete one operation of a test in order to pass on the results to another for the next step in the sequence.

Biochemistry technicians have somewhat more contacts outside the laboratories than do other technicians. In two of the laboratories in our sample they collected the blood samples directly from the patient. Outpatients come to the laboratories to have samples taken. There is also some direct contact with doctors and internes regarding the results of tests.

Blood Bank

In most of the hospitals in our sample, the blood bank is the least favoured unit in terms of space. Typically it consists of one small, cramped room filled with refrigerators and racks for test tubes. Some banks have offices for the head and the secretary.

Only one hospital in our sample had a staff medical director of the blood bank. He was also head of bacteriology. All the others were supervised by a head technician.

The method of collecting blood samples from the patients varies in the different hospitals. The two largest hospitals had a special group of intravenous nurses attached to the blood bank. Usually, the attending physician makes a note of those patients who may require transfusions. Certain classes of patients, such as pre-operative ones, are automatically included. An intravenous nurse, an interne, or a ward nurse collects the samples and takes them to the blood bank. In some cases the I.V. nurses also obtain samples for the other laboratory departments at the same time.

The samples are then brought to the blood bank. If a transfusion is required right away, a cross-match test is conducted immediately by the technicians and the proper blood issued to the nurses. Otherwise, the tests are conducted in the course of the day's routine.

The question of responsibility is very important, because of the great danger to the patient from a transfusion of the wrong blood. Officially all requisitions for blood must be signed by a doctor, but sometimes ward nurses and intravenous nurses sign for the doctor if he is absent. In one of the hospitals in our sample, until recently only internes could take samples, collect the blood from the blood bank, and conduct transfusions.

On the receipt of a requisition and a blood sample at the blood bank, a card is prepared for each patient and a record made in a day book.

There are typically three divisions of tasks in the blood bank: grouping, cross-matching and prenatal. In the larger departments, the technicians rotate among these tasks every two or three days. In the smaller ones, the technicians on duty perform all three.

Supervision of these tests is minimal for experienced technicians because the tests are simple and routine. When antibodies are found in the blood, special tests may be required and the help of the charge technician may be sought. Inexperienced technicians do not attempt special tests.

When the tests are completed, the results are noted on the patient's card and on a card affixed to the bottles of blood. The intravenous nurses then take the blood and perform the transfusion, if required immediately. Otherwise the blood is marked as suited to an individual patient and stored until required. It may be picked up later by an I.V. nurse, an interne or a ward nurse. He or she must sign for the blood before taking it.

Haematology

These laboratories usually consist of one large room filled with benches containing laboratory apparatus. Most laboratories now have automatic counting machines on the benches. The larger hospitals usually have a staff haematologist. The smaller hospitals have no medical director and the department is supervised by a head technician.

Some of the larger laboratories have specialized sections within haematology. For instance, Hospital C has one technician working full time on blood coagulation and another on haemoglobin athalacemia tests. There was also until recently a technician who did all the amino acid tests.

Aside from these specialized tasks, all the work in the department falls into "the routine" — i.e., counting the various kinds of cells in different samples of blood. Typically, this is subdivided into a number of jobs which are rotated every week or so. In the haematology department of Hospital A, these jobs were haematocrits, setting-up, counting by hand, staining, counting by machine, and sedimentation rates for outpatients.

In some departments, the technicians themselves go to the wards every morning and collect the specimens. In others, this may be done by the ward nurses or by the intravenous nurses. The requisitions are registered in a book and a number given to each specimen. Two samples of blood are taken from each patient. The head technician generally checks the results when they come in. She also is called upon to do further investigation whenever something out of the ordinary is found. When abnormalities such as tumor cells are found, the investigation is referred to to the pathologist as in Hospital A, or to the haematologist if there is one.

As in the other laboratories, the main source of error is the misnumbering of tests. This is guarded against by extreme care and multiple checks throughout the testing process.

Pathology

The hospital pathologist typically is directly in charge of the histology and cytology laboratories. He also may have more general authority over the other laboratories in the hospital.

Physically, the pathology laboratories consist of at least two large laboratory rooms, one for histology and one for cytology, plus separate offices for the pathologist and his secretary. There is usually also a smaller room where internes cut sections from gross specimens and dictate reports. Old microscope slides are stored in large filing cabinets in these laboratories.

Some pathology laboratories have additional parts. Hospital B, for instance, has an electron microscopy section. A neuropathology laboratory and "bone lab" are in the planning stage. Most at least have cytology and histology, histology being subdivided into surgical and autopsy sections.

Specimens for these laboratories are brought from the operating rooms and the autopsy room each day. They are frequently carried by the pathology internes who then cut the gross specimens into smaller sections and dictate a report to a technician. The technician prepares a form on each specimen, registers it in a day book and then sends it along to the other technicians for embedding, slicing and the preparation of a microscope slide. The report form accompanies the prepared specimen to the examination stage where further notations are made. It is checked by the chief pathologist.

The pathologist, the residents or the internes in pathology generally read all the histology slides and make the final diagnosis and report. The technician's main job is to produce a high-quality slide from the tissue specimens for the doctors to examine. The chief technician checks all the slides for quality before they are sent to the internes. The internes read them, and make a report. In Hospital B, these reports are submitted to the chief pathologist for checking. The results are then sent to the wards for entry on the patients' charts.

Because of the extensive medical control of the procedures in histology, few technician errors result in mistakes which get beyond the laboratory. Again, the only real problem is correct enumeration of specimens. Sloppy technical work produces an unreadable slide which cannot be examined by the doctors, and another must be made. While this may mean the painful process of taking another sample from the patient, it does not result in a mistaken diagnosis.

The same situation holds true for the work of electron microscope technicians. The work of cytology technicians resembles that in haematology and biochemistry with respect to supervision and control. Here, however, the technicians do read the slides themselves and report their findings. The chief technician checks their reports.

Authority, Supervision and Control

In viewing the main patterns of supervision and relations of authority in hospital laboratories, it is useful to bear in mind the distinction between what the official or formal division of responsibility is said to be, and the actual working arrangements that have grown up. Before discussing authority and supervision within the laboratories, however, we shall look briefly at the position of the laboratories within the wider chain of command of the hospital.

Under the Board of Directors, most hospitals have dual lines of authority: those leading to the medical chief of staff, and those leading to the hospital administrator. Most major decisions affecting the laboratories are worked out by representatives of these two lines. Presumably decisions involving budgetary allocations for expansion, new equipment, and so on are made in this fashion. More commonplace decisions involving the laboratories are divided between these two groups. The laboratory supervisors are accountable to the medical staff for some things and to the hospital administration for others.

Typically, personnel administration, hiring, firing, promotion and discipline are ultimately the responsibility of the administrator. In actual fact, most of this responsibility is delegated to the director of laboratories or the head of the individual department. He merely passes along his decisions to the administrator for ratification.

Responsibility for the medical and technical work of the laboratories is more difficult to trace. Laboratories in larger hospitals usually have full-time medical directors who are on the medical staff of the hospital. They assume full responsibility for the medical soundness of the laboratory work, and are answerable for it to the governing medical authority in the hospital. Smaller hospitals, on the other hand, may have only one M.D. in charge of a single laboratory (e.g., pathology). He is not necessarily responsible for any of the hospital's other laboratories. In such a case, the head technician assumes a de facto responsibility, in which his

professional and legal status is ambiguous and circumscribed. However, the very prevalence of this arrangement seems to indicate that problems seldom arise. In short, there are few situations in which the work of the laboratories is so grossly inadequate as to raise questions of responsibility at the top levels, and to create the demand for a clear definition of lines of authority and responsibility.

Within the laboratories the division of authority and responsibility varies depending on whether there is a medical director. It also varies according to the particular technology of the individual laboratory. The department in which the doctor retains the greatest degree of control and exercises the closest supervision is pathology. He must read all the slides and make the final diagnosis directly from them. The technician's responsibility is limited to the preparation of a readable slide. If the slide is unreadable, no diagnosis can be made. The next greatest degree of medical control exists in those laboratories where the doctor must check the written reports on all tests before they are sent out. Although he does not make a final judgement by looking at the actual material being tested, as does the pathologist, he is usually able to detect errors in the physical operations by reading the written results. This type of control is most prevalent in bacteriology, haematology and biochemistry laboratories in the larger hospitals. It should be noted that in some of these situations, the doctor's control is not as tight as it appears on paper — the head technician may sign the report in his absence, or the doctor may sign the reports without checking them closely.

In some laboratories, although there is a doctor in charge, he may not even make a pretense of checking the results of routine work. This may be entrusted to the head technician, while the doctor devotes his time to special cases and research. Only when a wrong result is reported back from the wards is his responsibility invoked.

The overall picture which emerges with regard to medical intervention in the supervision process is one of minor participation by the medical heads of laboratory departments. Only the largest hospitals have such medical directors; and in most laboratories, except pathology, they provide only minimal supervision. The real burden of supervision and control rests with the technical heads.

Between the medical directors and the technicians in the larger hospitals is a no man's land inhabited by university-trained scientists. While they may hold a B.A. or an M.A. or even a Ph. D., they do not have the medico-legal status of an M.D. and so cannot officially assume the same degree of authority and responsibility as a medical director. Despite their superior professional experience they are legally responsible only to the same limited extent as are head technicians. In those laboratories with a doctor and a scientist on staff, the latter is always subordinate to the former. He is, however, universally placed in a higher position of authority than the head technicians. In laboratories with a *scientist* and a head technician, the division of responsibility is similar to that in laboratories with a *doctor* and a

head technician. The scientist may have to sign outgoing reports but he does little direct supervising. Most of his time is devoted to special testing, methods development, or research. There were relatively very few university-trained scientists in the laboratories in our sample.

Evidently, the real responsibility for producing accurate results rests with the technicians themselves — the charge technician and his staff. In almost all the laboratories the head technician checks the written reports on the tests before they are passed up the line. In a few cases, he also supervises the work in process; but for the most part the technicians work by themselves, relying on their own judgement to produce accurate results.

This is not an unusual expectation. Most of the testing is highly standardized and routine. By performing the same relatively simple operations day after day the technicians learn where to expect mistakes and how to correct them. They know very well what range of results will be forthcoming.

An exception is the work in biochemistry. Here chemical reagents may be faulty or complex equipment may develop a flaw. Rigidly and frequently administered quality control programs are required in this area.

In most instances, the main source of error in all laboratories is not technical but human — the mislabelling or misnumbering of samples. Not only are the technicians taught to be extremely careful in this respect, but also most laboratories have developed double-check procedures whereby the head technicians can ensure that the right number is on the right sample. Indeed, some laboratories attempt to counter errors of this type by sending their own technicians to collect specimens directly from the patient and afterwards to write the results on the patient's chart.

In comparison with the small and simple laboratories of the past, those of the large hospitals today are huge and complex. The increased numbers of specialized technicians have called for more elaborate systems of authority, supervision and control. In place of the equality and personal control of the old laboratories, a hierarchy of responsibility with numerous gradations has emerged. To illustrate the evolution of this hierarchy, and to show the extent of the differences that still obtain between large and small hospitals, it is informative to contrast the situation in the two extremes for our sample: the large highly automated biochemistry laboratory of a big Toronto teaching hospital and the small, general-purpose laboratory of a central Ontario community hospital.

Although the authority structure of the latter is simple in comparison to that of the former, it has come a long way since 1945, when it consisted of the present head technician and his wife. Now there is a full-time pathologist who is nominally in charge of the whole laboratory. So far his activities are confined to the histology section where he directs the work of one full-time technician. The head technician

supervises and checks the work of the remaining nine technicians in the other sections. Of these, two are assistants, one collects the blood samples for the laboratories, and another is a media-maker in bacteriology. The head technician has an assistant who is charge technician in biochemistry. Between them, they run the quality control program for the entire laboratory, do all the final identifications in bacteriology, and still carry a reasonably full load of technical work in biochemistry.

The administration of the laboratories is relatively casual; rotations and shift work are cooperatively decided and close personal communication exists between technicians and doctors. There are really only three distinct levels of authority in this hospital: the medical director, the head technician, and the rest of the technicians.

In sharp contrast is the situation in the biochemistry laboratory in a big urban teaching hospital. This laboratory, it must be emphasized, is only one of five in the hospital. The others are of almost equal complexity.

The head of the biochemistry laboratory is a full-time medical director with extensive postgraduate research experience in chemistry. He runs two separate laboratories: a routine biochemistry laboratory and a metabolic renal laboratory. The former unit is further subdivided into a service laboratory and a methods development laboratory.

The renal unit and the routine laboratory are each headed by a Ph.D. in chemistry. Under the Ph.D. director of the renal unit is a head technician. The service section of the routine laboratory has three further levels of authority under its Ph.D. director — an assistant chemist, a chief technician, and the rest of the technicians.

Although the medical director and the two Ph.D.'s make the important decisions, the bulk of routine administration and supervision is done by an assistant chemist and the chief technicians. The senior scientists devote most of their time to advanced technical work, research, clinical investigation and the devising of new techniques.

The division of authority and responsibility is, then, extremely complex, with as many as five distinct levels. There is considerable delegation to the lower levels, however.

In those hospitals run by a religious order, a further refinement exists. A religious chain of command is superimposed on the medical and technical one. Usually a member of the order is technical director, or administrative director. Often her role involves primarily financial and personnel matters.

In the authority structure of their laboratories, most of the hospitals[2] in our sample approximated the case of the big city hospital rather than that of the small community one. There can be no doubt that this is the trend of the future.

Administrative and Technical Specialization

In the preceding sections we have documented the complexity of the division of responsibility and specialized tasks in the hospital laboratories. We proceed now to emphasize this important development by cataloguing the different jobs and job titles which we found to exist. As mentioned earlier, the situation has altered radically over the years. Thirty years ago one or two categories of laboratory technicians performed a diverse range of tasks, whereas today there are five or six different laboratory subdivisions with at least two dozen full-time specialties.

The distinction between some of these specialized jobs denotes primarily a difference in administrative or supervisory responsibility. For the most part, however, the distinction indicates a difference in the technical content of the work. There are other bases for distinction as well; for instance, a number of jobs have been created for full-time training officers. Whatever the roots of their emergence as separate specialized jobs, the noteworthy facts are that the proliferation of specialties has been extensive, is continuing, and has important implications for the training of technicians and the staffing of the laboratories.

By way of cataloguing the different job titles, let us first consider the division of authority and responsibility which has emerged. The following is a list of commonly used titles which denote position in the hierarchy. These titles are bestowed by the hospital, not by the occupational associations.

1) Medical director
2) Chemist, bacteriologist, haematologist (university science graduate)
3) Technical or administrative director
4) Assistant technical director
5) Charge, head or chief technician
6) Assistant charge technician
7) Senior technician
8) Intermediate technician
9) Junior technician
10) Student technician
11) Assistant technician
12) Technician's aide

[2]See the Appendix for a detailed description of the laboratory organization of each of the hospitals studied.

In the giving of orders only the first six titles involve real distinctions in authority. The remaining six denote differences in experience and responsibility.

Another basis of distinction which sometimes corresponds to this hospital-set hierarchy of responsibility is the scale of professional qualifications as bestowed by the Canadian Society of Laboratory Technologists or an equivalent association. Their hierarchy includes these titles:

1) Licentiate
2) Advanced registered technologist
3) Registered technologist
4) Student technologist

The most prolific source of new and distinct job titles is technical specialization. The following is a list of full-time laboratory jobs for which the basis of distinction is differences in the technical content of the work done. In the case of a job which is unique to one hospital, the hospital's identification letter follows the job title.

1) Routine biochemistry technician
2) Autoanalyser operator technician (C)
3) Special chemistry technician (A, D)
4) Biochemistry technician (steroids)
5) Biochemistry technician (methods development) (B)
6) Biochemistry technician (special investigation — chromotography lipids) (C)
7) Routine bacteriology technician
8) Bacteriology technician (infectious diseases) (B)
9) Bacteriology technician (blood cultures) (B, C)
10) Blood bank technician
11) Intravenous nurse (blood bank)
12) Cytology technologist
13) Cytology assistant (R.N.A.) (D)
14) Histology technician (routine)
15) Histology technician (surgical)
16) Histology technician (autopsies)
17) Electron microscope technician
18) Haematology technician (routine)
19) Special haematology technician (amino) (C)
20) Special haematology technician (blood coagulation) (C)
21) Special haematology technician (haemoglobin athalacemia) (C)
22) Haematology assistant (R.N.A.) (D)
23) Dishwasher
24) Technician training officer

To these should be added several other jobs which in some cases come under the jurisdiction of the hospital laboratories:

1) ECG technician
2) Medical photographer
3) Medical electronics technician

These lists do not cover another category of laboratory personnel which is by no means insignificant — that which includes the part-time technicians, night workers and summer students.

The extent of proliferation of specialized jobs in the laboratories is illustrated dramatically by a rough count of the different titles we encountered. In the preceding lists, *omitting the hierarchical distinctions in professional credentials,* there are at least forty distinct and separate specialized jobs within the field of hospital laboratory technology.

It is important to qualify this finding. First, no single hospital, even the largest, includes *all* these different job categories in its laboratories. Indeed, only the largest metropolitan hospitals have anywhere near that number. The numerous regional and community hospitals have only a small fraction of the total.

Second, to what extent do these different job titles reflect real qualitative differences in skills, knowledge and job activities? As has been noted, the authority gradations have real meaning only for the top several categories. Only directors and head technicians issue orders. The lower gradations merely reflect slight differences in responsibility, in the degree of autonomy from close supervision. A junior technician becomes an intermediate and then a senior by simple virtue of seniority in less than five years. The jobs a senior technician is assigned are not necessarily more difficult and do not always involve more autonomy.

Differences in professional credentials also may have little meaning. There are many non-registered technicians in positions which, if the CSLT had its way, would be filled only by technicians with Licentiates or A.R.T.'s. Further, possession of a Licentiate, an A.R.T. or an R.T. does not automatically guarantee that the holder will eventually occupy a senior position. In the main, however, the hospitals do reward these credentials with higher salaries and positions. Paradoxically, these degrees, awarded for *technical* achievement, frequently lead to *supervisory* jobs where the technical element is subordinate.

As for the differences in the technical content of the job, the depth of the skills and knowledge differences among specialties must not be exaggerated. The lack of mobility of technicians between different laboratories may be due more to the need for staff stability than to the difficulty of learning a new technical specialty. The generalist technician in the small hospital who does a variety of tests from all fields attests to the fact that each specialty is not impenetrable in its individual

complexity. Within each laboratory, the prevalence of rotation schemes also demonstrates the fundamental similarity of many "specialized" jobs. Of course, many of the specialized jobs do represent a real specialty in terms of skill and knowledge content, and the time required to learn them. There is a real difference between electron microscope technicians and biochemistry technicians; a bacteriology technician cannot transfer easily into haematology with no background; nor is the skill difference between cutting sections in pathology and cross-matching bloods easily bridged.

What are the core elements in the technician's skills and knowledge? The first is a practical knowledge of the fundamentals of the biological sciences and chemistry. The second is the bundle of knowledge and skills that constitute "laboratory technique"; for instance, knowing how to use burettes, pipettes, microscopes, how to measure quantities and concentrations of materials, how to prepare solutions.

These are the core elements on which the more specialized skills and knowledge are superimposed. The nature of the superimposed element varies by laboratory. The routines in haematology, blood bank and biochemistry seem roughly similar in respect of the blend of manual skills and scientific knowledge. In pathology a very fine manual skill must be learned for cutting sections. Bacteriology requires primarily a knowledge factor — how to identify bacterial growths. Laboratory manuals, setting out in detail the exact steps to follow in all tests, are used extensively in the process of acquiring these skills and knowledge.

Regardless of whether the superimposed component is primarily a matter of manual skill or practical knowledge, it quickly becomes reduced to a routine or series of routines which are repeated every day. After a short time the technician no longer needs the "cookbook" to guide him. Unless his equipment becomes faulty or an unusual case arrives, his activity consists of a reflex repetition of a few well-learned techniques.

When special cases do arise, his capacity to deal with them is limited. The ordinary technician has neither the background depth in theory to do his own scientific trouble-shooting, nor the mechanical knowledge to repair the more complicated machinery. Frequently a laboratory will have one or two people with the requisite background to tackle these tasks.

Scientific trouble-shooting, special tests, and so on are usually handled by a university-trained person. Mechanical repairs on complex machines are done by a technician who has taken the manufacturer's course on the equipment. Head technicians sometimes can do both kinds of special work, having learned from experience or from observation.

The extent to which technicians feel themselves to be a part of the medical team and the healing process is difficult to guage. In some laboratories there is more opportunity to see the medical content and implications of each test. The technicians may learn something of the medical history and diagnosis of the patient on whom the test is being done. They may be able to interpret their results and anticipate the prognosis for the patient. They may have a slightly greater degree of contact with the attending physician. In bigger, high-volume laboratories such as biochemistry, the technicians may, on the contrary, have no idea of the medical context and implications of their tests. Here they are simply dealing with masses of numbered test tubes. They may seldom get outside the laboratory or see an attending physician or a doctor. Their work may approximate that of an assembly line in its impersonality.

Staffing the Laboratories

Responsibility for Training, Recruitment and Career Development

Broadly speaking, there are two main ways in which people enter an occupation. Certain old professions and well-established trades have strong professional societies or unions which control entry to the occupation, set training and certification standards, and direct the career steps of the members. The other main avenue is that in which the employing organization selects, recruits, trains and promotes people with a given level of general educational background. Usually, the former method gives the main control to the professional society or trade union; the latter, to the employer.

Historical circumstances have resulted in a combination of these two systems with respect to the hospital laboratory technicians. Until recently, the CSLT played a minor role in recruitment to the occupation. The hospitals assessed their own needs, hired their own trainees on the basis of varied criteria, and trained them using a variety of methods. The present prevalence of non-registered technicians and technicians with credentials other than those of the CSLT bears witness to this. More recently, however, the Society has expanded its membership and established its certification procedures in many hospitals. Total membership has more than doubled, from 3,053 members in 1960 to 7,228 in 1966. Nevertheless, it is still far from exercising total control over entry to the occupation. Few, if any, hospitals are CSLT "union" or "closed shops".

The following table indicates the proportion of laboratory technicians in our survey of five hospitals who belong to the CSLT. Although there are variations among the hospitals, on the average one-half are members.

TABLE 1[1]
Laboratory Technicians by Association Membership

	CSLT	Other
Hospital A	18	15
Hospital B	n/a	
Hospital C	7	21
Hospital D	15	3
Hospital E	3	4
Total	43	43

[1]The N's in these tables vary because of different response rates to different questions. In several cases data are unavailable for Hospital B because a different questionnaire was used.

When the topics of training, recruitment, promotion and careers are discussed, it must be remembered that although the Society's policies have considerable influence, the personnel policies of the individual hospital have the major voice. To a certain extent hospital policies follow the recommended procedures of the CSLT, but in many cases they do so only where they find it convenient. The CSLT can only make recommendations to the hospitals with respect to the qualifications of technicians, working conditions and salary schedules; it has no legal power to enforce them.

Formal Training Programs

Only one of the hospitals in our sample — Hospital E, the smallest one — is not at present participating in a CSLT certified training program. Both Hospitals B and C in the city of Toronto now send their trainees to the joint program operated by several downtown hospitals which offers academic training at a central school situated at the Toronto General Hospital. Hospital A in Ottawa has its own program in all subjects. Hospital D in northern Ontario offers training in all the laboratory specialties in which the hospital provides services.

The objective of training programs certified by the CSLT is the admission of the trainee to the Society as a registered member after successful completion of CSLT examinations. The Society provides a syllabus to the training school outlining the courses to be followed in order to prepare the candidate adequately for the examinations. The schools are inspected by a team from the CSLT and CMA every four years.

Certification examinations may be taken in one of two areas, the R.T. (Subject) and the R.T. (General). The former tests specialized knowledge in one laboratory field; the latter, general knowledge of all laboratory fields. Training for the R.T. (General) usually consists of one year of didactic lectures and one year of on-the-job internship. "The training . . . is based on the concept of tuition in

general laboratory knowledge (including elementary anatomy, physiology, essential mathematics, etc.) and specific training in theory and methodology in clinical chemistry, clinical microbiology, haematology, blood-banking and histology".[3]

The R.T. (Subject) is designed for those who have taken specialized training and for older technicians who have long experience in a laboratory but who have never taken a formal course.

The Society offers two levels of advanced certification, the A.R.T. (advanced registered technologist) and the Licentiate.

> Progression from one Certification level to a higher level requires a minimum period of advanced training and experience of three years (normally 3-5 years), and defined eligibility credits must be accumulated during this period preceding examination. At the A.R.T. level, two types of Certification are offered: one in the General field, A.R.T. (General) and the other in one of the Medical Laboratory disciplines, A.R.T. (Subject). Licentiate Certification is the highest level of Certification obtained by examination in this society, and there are two ways in which this Certification may be achieved. One of these emphasizes the administrative and organizational aspects of the individual's work, and the other emphasizes the highly specialized nature of his advanced qualifications in a special subject area. It may be noted that provision is made in the Certification Program for the granting of a Fellowship, but this will be conferred only by nomination of eligible candidates of outstanding abilities and knowledge.
>
> The Certification levels and channels of progression which have been approved are shown as follows:

R.T. (General)	A.R.T. (General)		
R.T. (Subject)	A.R.T. (Subject)	Licentiate	Fellow[4]

This is how, in theory, the CSLT training programs are organized. Among the Society's registered members in Ontario there are 1,186 R.T.'s, 161 A.R.T.'s and forty-eight Licentiates (1966). In percentage terms this works out to 85 per cent R.T.'s, 12 per cent A.R.T.'s and 3 per cent Licentiates.

TABLE 2
Laboratory Technicians by Qualifications

CSLT members					Non-CSLT				
R.T.	B.A.	2 or more	No formal qualifications	Certificate from other assn.	B.A.	M.D.	R.N.	2 or more	No formal qualifications
32	1	4	4	6	5	1	3	4	27

[3]Excerpt from a brief prepared by the Planning Committee for the proposed Toronto Institute for training in the technological aspects of laboratory medicine, submitted to the Committee on the Healing Arts, January 5, 1967.

[4]Brief of the Canadian Society of Laboratory Technologists to the Committee on the Healing Arts, p. 4.

Table 2 shows the distribution of qualifications among the laboratory personnel in our sample. As we noted previously, a substantial proportion of the technicians in our sample do not have CSLT credentials. This reflects the fact that in the past the hospitals did not produce enough technicians from their training programs to fill their own needs. The following section will examine the training programs in each of the hospitals in our sample. Then an examination will be made of the recruiting practices by which the necessary extra technicians are obtained.

Hospital A—Ottawa. This training program was started by the Sister who is chief medical technologist. She holds an A.R.T. certificate and has held office in the CSLT. She is a strong supporter of the CSLT and of the professionalization of laboratory technologists.

The school accepts ten or eleven new students a year and usually graduates seven or eight. Seven Ontario grade 13 credits or the Quebec equivalent are the prerequisite for admission. The CSLT stipulates chemistry, physics or biology and mathematics A as compulsory subjects. The course involves eighteen months' training, about half theory and half practical work, before the R.T. examinations are written. Training is offered up to the R.T. level. Despite the fact that many of the trainees are French-speaking, all courses are in English.

After entering in September, the students take six weeks of orientation and formal courses. Following that, they spend six weeks in each of the seven laboratories for on-the-job training. They may then choose to specialize in one field. While in training the students are paid $125 a month. In return they contract to remain with the hospital for at least one year after graduation. The school does not produce enough technicians to fill the hospital's needs. Expansion is hindered by lack of space and money.

Hospital B—Toronto. Until about two years ago this hospital had its own separate training program. Now it sends its trainees in most fields (bacteriology, biochemistry and blood bank) to the central school at the Toronto General Hospital for the one year of academic training and brings them back for the one year of practical internship. Hospital B sponsored six such trainees in 1966 and 1967. The cytology trainees attend the school at Toronto General Hospital run by the medical director of cytology. This graduates only six technicians a year. Admission procedures at the latter are informal; when the pathologist at Hospital B has a vacancy coming up he phones the medical director of the school and arranges to sponsor a trainee for the next year.

The academic phases comprise approximately 100 hours of lectures in all. The students are paid $100 a month by the central school for the first year, and by the hospital for the second.

Academic prerequisites for admission to these programs are the same as in Hospital A. Although the main central school gives a general R.T. course featuring

training in all specialties, students usually spend their internship working in one particular laboratory. Because the Toronto training arrangements were in a state of flux at the time of writing, it is unclear how long these training methods will continue.

Each participating hospital is responsible for selecting and sponsoring its trainees. In Hospital B this responsibility falls on the shoulders of the head of each laboratory. Aside from the academic prerequisites, they have a free hand in designating the other criteria for selection.

Hospital C—Toronto. As in Hospital B, the training situation here is rather confused because of the great number of recent changes. This hospital has its own training programs in several fields and cooperates with the central school in others. Admission requirements for the central school program are now the same as those recently in effect in the first two hospitals. Applicants must now have seven grade 13 credits including two sciences and mathematics. In 1965 and 1966 the hospital sponsored four students at the central school.

The pathology laboratory, the bacteriology laboratory, the blood bank and the biochemistry laboratory at Hospital C all operate training programs. The chief chemist prefers to train his own technicians and has been doing this for a long time. The number of applicants both to the training program and to the biochemistry laboratory itself has been declining in recent years. He looks for grade 13 graduates but accepts those with grade 12 if there are places left. His own daughter is among the present trainees.

The chief chemist claims that it takes three months to retrain a technician with an outside R.T. for his laboratory. Those whom he trains from scratch require two years' training before they are considered equal for work and salary purposes with the R.T.'s. His own program consists mainly of on-the-job training. One-hour seminars are held each week to help give the students some feeling for the medical background of their work. These are often attended by the regular staff. The chief chemist thinks that people with no previous technician training make the best candidates for learning autoanalyser techniques.

Although interviews with laboratory directors provided some contrary indications, the hospital reported no shortage of technicians.

Hospital D—Northern Ontario. This hospital has a well-organized and progressive training program. Until two years ago each hospital in the city had its own training program. Each school followed the two-year combination didactic lectures and apprenticeship method. The lectures were given by senior technicians in each of the laboratories. Two years ago, a proposal was submitted to the CMA Accreditation Committee concerning the establishment of a Bachelor of Science course in either microbiological or haematological technology at the local university. This

was enthusiastically received by the Committee. The proposal was dropped, however, because the pathologists in the city hospitals would not support it; they claimed that a minimum of thirty to thirty-five students a year would be needed to make their lectures worthwhile. The hospitals then had two alternatives: they could continue with the old system, or they could transfer their school to the new College of Applied Arts and Technology. The latter alternative was turned down because it was feared this course would preclude any chances of setting up a university course later. As a compromise a centralized program for the three city hospitals was established instead. This will come into effect in the fall of 1969. Plans call for this program to be expanded within a year into a regional school which will provide facilities for a large portion of northern Ontario. The idea of a regional school will be submitted to the CMA-CSLT Committee during its autumn rounds.

So far there has been no shortage of applications. In 1968 there were thirty, of which fifteen were accepted for entrance in the fall. This is more than double the number of trainees in each of the much larger Toronto hospitals. The selection and training process operates as follows. There is a close liaison between the director of laboratories and several high school teachers. The latter suggest laboratory careers to promising students. Applications are received while the students are still in grade 13. After they apply, students are interviewed in the department and the general outlines of laboratory work are explained to them. When the grade 13 marks are released, a final selection is made. About half of the applicants usually fail their grade 13 examinations and so are ineligible for the training program. Even at that, two or three applicants usually must be rejected in order to keep the class down to the desired size. The first six days are set aside for general orientation. Then the students spend one month in each of the six laboratories. Examinations are written at the end of each month. This arrangement functions as a selection device; at the end of six months, both the students and the hospital will know whether they are mutually compatible. The two-year program is divided about equally between didactic lectures and on-the-job practical training. The lectures on theory are given in the mornings and again in the afternoons in a special classroom; during the mornings the students also work in the laboratories. The theory being taught may not relate directly to the laboratory work the student is doing.

During these two years the students find the subject they prefer and move towards it. By the end of the training they generally know which laboratory they want to work in. The director claims that careful screening and selection ensures that the calibre of technicians is very high. He says that the laboratory field is becoming so demanding that laboratories no longer can hire someone out of pity. They must select and train only the best.

Professional interest is kept high both during the training and afterwards by the local academy of the CSLT, which is very active. Laboratory technicians and

students present papers at these meetings. A comparatively high proportion of the R.T. graduates go on to some advanced training and certification. In contrast to several other hospitals we visited, well-organized programs for advanced training are available. In fact, the students are urged to go on. The new central school will provide courses up to the R.T. standard and also specialized courses for graduate work.

Hospital E—Central Ontario. Although it has a training program for radiological technicians, this hospital has no certified program for laboratory technicians. Until two years ago, when technicians from the Philippines became available, the shortage of qualified technicians approached crisis proportions. For many years, however, the head technician in the laboratories operated an informal training program. Local people, often housewives, were brought in and taught on the job. They usually had three or four years of high school. The head technician still feels that it is faster and more efficient to hire a high school graduate and train her from scratch, than to send someone away to take the R.T. course. At present the laboratories employ several high school students as summer help. After two summers' experience they are almost fully trained. He hopes that some of them will either take the R.T. and return to town, or join the laboratories directly after they finish school.

Recruitment Practices and Results

Sources of Supply

It is evident from the foregoing that these hospitals meet only a small part of their need for qualified technicians through their own training programs, both formal and informal. Where, then, were their technicians trained?

TABLE 3

Formally Trained Technicians by Source of Training

	Ontario	Other provinces	Outside Canada	Total
Hospital A	11	3	10	24
Hospital B	n/a	n/a	n/a	
Hospital C	8	1	7	16
Hospital D	12	1	6	19
Hospital E	1	n/a	5	6
Total	32	5	28	65
Percentage	49	8	43	100

Table 3 shows that 51 per cent of the formally trained technicians for whom we have data come from outside sources; only 49 per cent were trained in the province of Ontario. Of those technicians born outside Canada, over 85 per cent were also trained outside Canada. This table indicates a heavy reliance on non-Canadian trained technicians to staff Ontario hospitals.

The importance of immigration in providing laboratory technicians is even more apparent when the birthplace of all laboratory technicians, regardless of their place of training, is examined. Over 40 per cent of these scarce products have come from other countries to Canada.

TABLE 4
Laboratory Technicians by Country of Birth

Hospital	Canada	U.S.A.	Latin America West Indies	West Europe	East Europe	Oceania South America	India Pakistan	Philippines Asia	U.K.	Total
A	22		1		3	1		3	4	34
B	26			4	5	1	2	3	3	44
C	14			2	6			3	3	28
D	12			2	1				4	19
E	1				2			3	1	7
Total	75		1	8	17	2	2	12	15	132
Percentage	56.8		.7	6.1	12.9	1.5	1.5	9.1	11.4	100

Another important feature of the supply of laboratory technicians is that the great majority are women. This figure of 84 per cent female reflects also the general pattern for all the paramedical occupations.

TABLE 5
Laboratory Technicians by Sex

Hospital	Male	Female
A	8	25
B	7	36
C	2	26
D	3	16
E	1	6
Total	21	109
Percentage	16	84

Three important aspects of the source of supply of laboratory technicians are, then, the reliance on personnel trained outside the employing hospitals, the reliance on immigrants to Canada, and the reliance on women. The recruitment policies and practices of the hospitals show a strong awareness of these facts.

Recruitment Policies and Practices

In all the hospitals, of course, requests from the laboratories for additional personnel must be cleared with the administration. To a considerable extent, however, the responsibility for defining need, deciding qualifications, and interviewing candidates for vacancies rests with the directors and head technicians of the laboratories.

As we have seen, all but one of our sample hospitals have training programs for laboratory technicians. In these four programs, with the possible exception of

Hospital D, there are seldom enough graduates to fill the vacancies on the laboratory staffs. This is due partly to the unpredictable rate and timing of resignations. On the whole, however, it does not seem to be hospital policy to be fully self-supplying.

One unremarked feature of the training system deserves attention. Like hospital nursing schools, this method of training provides the labour of students at a relatively cheap price. The costs of housing, feeding and extensive didactic lectures which nursing schools bear are absent in the technical training programs, but are partly balanced by the higher wages ($100 to $125 per month) paid to student technicians. At any rate, for at least a year of his training, the student technician does work almost identical to that of a registered technician at less than one-third the payroll cost to the hospital.

Let us examine the recruitment policies and practices existing in the hospitals in our sample.

Hospital A—Ottawa. When a vacancy arises or when a new post is created, the technical director (a nun) notifies the administrator to advertise the job if she is unable to fill it from the ranks of her student technicians. Advertisements are placed in local and national newspapers, as well as in the CSLT publications. Applicants generally are interviewed by the personnel manager and the technical director in committee with the appropriate chief technician.

A substantial proportion of the present staff has been recruited this way. They have many technicians from the Philippines with a university degree of some kind. These girls are highly mobile; often they have come from the U.S. on the expiration of their visas. The second largest outside group is from the U.K. There are problems with the visas, however, as this quotation from one of our questionnaires indicates:

> . . . we have been dependent to a considerable extent on graduates from other countries, particularly from the Philippines or from Philippine technologists whose visas have expired in the U.S.A. Ads have been put in the Journals of Medical Technology in Canada and Great Britain. However, the visa problem is an acute one. Many of the technologists who have been offered positions on our staff were not able to present themselves for work until 6 months or a year later, creating many problems of unfilled posts.

They get very few applicants from other Canadian cities. Less than 5 per cent of their R.T.'s originally began as non-registered technicians and obtained their credentials later. This hospital has a very high turnover rate in its laboratories; the search for technicians for the blood bank, in particular, is a desperate one.

Hospital B — Toronto. The administrator claims that the majority of the laboratory technicians were locally trained. The Toronto area comprises a distinc-

tive labour market for hospital technicians. They are in greater supply here than elsewhere in the province. This is due partly to the attraction of the big city for girls from smaller centres, partly to the extensive training facilities available, and partly to the fact that many qualified immigrants congregate in Toronto.

The present structure of technician training in Toronto does not foster a surplus of technicians from the local training programs, however. Each hospital sponsors only a limited number of students at the central school. Usually, the number is based on present needs or an optimistic forecast of what needs will be at the time the students graduate. Almost always this estimate is low. Unlike some hospitals which have their own individual programs, Toronto hospitals have no surplus of students to meet unanticipated demand. Therefore, a considerable number of technicians must be hired on the open market.

The biggest group of outside recruits are the Philippine technicians, many with pharmacy degrees from Philippine universities. This Toronto hospital also gets a substantial number of European immigrants, as well as girls from other parts of Canada. It advertises in local papers and sometimes in national papers and journals.

Hospital C — Toronto. This hospital professes no shortage of technicians. Apparently it enjoys an unusual stability of staff. In 1965 and 1966 it sponsored only four new students at the central training school.

Despite this happy situation, one laboratory director reported a decreasing number and quality of applicants in recent years. However, the decline is far from approaching the crisis proportions that have arisen in some other hospitals.

Hospital D — Northern Ontario. Due to the comprehensive training program described at length earlier, this hospital is, to a large extent, self-sufficient with regard to laboratory technicians. This self-sufficiency is felt to be necessary because of the alleged great difficulty in attracting qualified people to northern Ontario. Apparently the prospect of living there does not appeal to many technicians, especially girls.

At one time, many of the more qualified technicians were recruited from England. According to the technical director, himself from England, it has become increasingly difficult to attract people from this source.

Because of the excellent training program, the difficulty in attracting workers to the city is not a major drawback in the laboratories. However, in other paramedical fields, such as physiotherapy and medical records, the problem is acute. Widespread advertising brings in few applications. Those who do apply are sometimes not well qualified.

Hospital E — Central Ontario. The recruitment situation here is dismal. There is no training program for laboratory technicians. The hospital advertises in

Toronto and national newspapers, in journals, and in the U.K. According to the administrator, these efforts are almost completely futile.

The one salvation has been the influx of technicians from the Philippines. The original Philippine recruits answered an advertisement in a Toronto paper. Now, apparently, word has gone around the Philippines that this hospital is a good employer. The laboratories are presently swamped with unsolicited applications direct from the Philippines.

As in Hospital D, the administrator claimed that no Canadian girls can be attracted to the community. The shortage of eligible bachelors and city excitement were cited as causes. The only Canadian-trained people who apply here are wives of men who have been transferred to the town. Recently the hospital obtained a physiotherapist and a laboratory technician in this way.

Apparently the prospect of living in this town does not bother the people from the Philippines. A unique situation has arisen — almost all of the Philippine technicians live in the same rented house, forming a well-knit colony. They have put together a folk-dance show which is in great demand for local functions.

Retention and Career Development of Laboratory Technicians

One of the most serious personnel problems in the laboratories is that of retaining new employees long enough to ensure efficiency and stability. Most of the laboratory heads in our sample found it necessary to provide informal on-the-job training in their particular routines to new recruits regardless of their previous qualifications, unless their CSLT training included a long internship in the laboratory. Frequently, however, by the time the new recruit is fully competent in the procedures of the laboratory, she has decided to quit. The turnover rate has reached epidemic proportions in some hospitals. The following section will examine laboratory personnel practices with respect to on-the-job training, salaries, hours of work, attrition and turnover of staff, and advancement and promotion policy.

Informal Training

Almost all the laboratory supervisors we interviewed mentioned some kind of informal on-the-job training for new recruits. Techniques utilized by different laboratories are sufficiently varied to make this necessary. The amount and type of training given also varies widely in different laboratories. In almost all cases, however, it is learning-by-doing following a brief talk by the head technician. During this period the new employee is closely supervised by the senior and head technicians. They are soon able to make an assessment of how familiar the new person is with their methods, and to determine how long she must be closely supervised. In most routine laboratories lengthy supervision is not required.

In the histology laboratory, on the other hand, the cutting of sections for microscope slides is a delicate manual-visual skill which must be practised for many hours before the inexperienced new technician has mastered it. On-the-job training and practice may last for months before the technician is fully competent.

Refresher and Advanced Courses

Although some qualified technicians take refresher and advanced courses, this practice is not widespread, as can be seen in Table 6.

TABLE 6
Laboratory Technicians by Number of Major (over 10 days duration) Post-R.T. Courses Taken

Hospital	None	One	Two	Three	Three plus	Total
A	27	4	2	0	0	33
B	n/a					
C	20	8				28
D	15	3				18
E	7			1		8
Total	69	15	2	1		87
Percentage	80	17	2	1		100

In our sample of laboratory technicians, only 17 per cent have taken one or more such courses. Further evidence on this point is provided by the 1966 Annual Report of the CSLT. In that year 1,088 candidates wrote the R.T. (General) examinations, and eighty-nine attempted the R.T. (Subject) in the whole of Canada. These are the initial certification examinations. In contrast only sixty-one technicians in the whole of Canada presented themselves for advanced certification. The Report noted that this was only 1.5 per cent of those eligible.

There are several reasons for this. Perhaps the most important is the limited availability and accessibility of such courses. There are two main suppliers of this kind of training — the CSLT, and the manufacturers of laboratory equipment. Although some of the course work for the A.R.T. can be taken by correspondence, attendance at a central school for a short period of time also is frequently required. In addition, it is often necessary to go a long distance to sit for the examinations. This is inconvenient, if not impossible, for many technicians. In many cases, too, the hospitals have no provision for paid leave or expenses for attendance at these courses. In the case of courses given by equipment manufacturers, the location may be a remote city in the U.S.A.

Not only do the hospitals fail to provide financial support, but they rarely

positively encourage their technicians to take these courses. The feeling is that the technicians are qualified enough as it is, and that absence would disrupt the routine of already overburdened laboratories.

Another reason is the weak motivation of the technicians themselves. In many cases they see no intrinsic advantage in taking a difficult course. Many of them have no high aspirations but simply regard their job as a temporary stage before travel or marriage. Often there is no salary or promotion incentive promised by the hospital if they complete the course. Only the most professionally minded are willing to make the sacrifices which such a program entails.

Salaries and Hours of Work

In its brief to the Committee on the Healing Arts the CSLT presented a recommended salary schedule. It incorporated suggested salary levels for a new qualifications grading system which it has proposed. (See Table 7.)

TABLE 7
Recommended Salary Schedule

Technological Classification	Initial Salary	Salary at Anniversary Service 1 year	2 years	3 years	4 years	5 years
Technologist Grade I	$4,320 p.a. 360 mo.	$4,500 375	$4,680 390	$4,860 405	$5,040 420	
Technologist Grade II	4,800 p.a. 400 mo.	5,040 420	5,280 440	5,520 460	5,760 480	
Technologist Grade III	5,520 p.a. 460 mo.	5,820 485	6,120 510	6,420 535	6,720 560	$7,020 585
Technologist Grade IV	7,200 p.a. 600 mo.	7,560 630	7,920 660	8,280 690		
Technologist Grade V	8,400 p.a. 700 mo.	8,820 735	9,240 770	9,660 805	10,080 840	
Technologist Grade VI	9,600 p.a. 800 mo.	10,080 840	10,560 880	11,040 920	11,520 960	12,000 1,000

SOURCE: Canadian Society of Laboratory Technologists Brief to the Committee on the Healing Arts, July 1966.

This schedule is rather idealistic. Table 8 lists the distribution of CSLT members in Canada in 1966. It is fruitless to try to interpret these data in the absence of comparative data from similar occupations. It does seem safe to say, however, that these salaries are very low in the light of the education, training and responsibility demanded of laboratory technicians. The technicians themselves think so; they are virtually unanimous in complaining about low salaries.

TABLE 8
Range of Annual Salaries, Registered Members, 1965
(N=2549)

Amount	Nfld.	P.E.I.	N.B.	N.S.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	% of total, all Canada
Under $3000					1		1		1	1	0.1
3001-3500	1	5	3	40	3	9	12	6	2		3.2
3501-4000		4	19	47	51	134	65	56	40	45	18.1
4001-4500	6	1	23	29	222	263	53	70	94	102	33.9
4501-5000	4	1	7	9	154	187	28	31	38	77	21.2
5001-5500	1	2	7	10	63	94	13	19	15	27	9.8
5501-6000	1	1	3	4	26	65	12	13	13	22	6.3
6001-7000		1	2	9	17	56	4	15	10	8	4.8
7001-8000	2			2	4	30	1	1	4	6	1.9
8001-9000					1	5	1			4	0.3
9001-10,000					1	3	1			2	0.1
Over 10,000					1			1	1		

SOURCE: Recorded from 2,549 registration forms submitted in 1966.

In our sample of 131 technicians in five hospitals, the distribution of salaries was as follows:

TABLE 9
Laboratory Technicians by Salary

Hospital	under $3,000	3,000-4,000	4,000-5,000	5,000-6,000	6,000-7,000	7,000-8,000	8,000 plus	Total
A	2	6	10	11	3			32
B	3	7	23	6	1		2	42
C	1	6	11	5			1	24
D		2	8	6	3			19
E			5			1		6
Total	6	21	57	28	7	1	3	123

The CSLT is deeply concerned about the salary problem. They view it as a serious obstacle to the professionalization of the occupation. The following is a quotation from the proposal for the establishment of a Toronto Institute for Training in the Technological Aspects of Laboratory Medicine:

> Few of the most senior technologists earn more than $5,000 to $6,000 per annum, whereas the most junior registered technologist commences at about $4,000 per annum. This type of salary prospect makes the career totally unattractive to males and experience shows that there is a high wastage rate in the predominantly female personnel. This wastage along with the unattractive salary prospect makes the availability of qualified experienced senior technologists very low indeed.[5]

The hours of work of technicians in our sample are similar in all laboratories. Most work a standard eight-hour day with extra duty on alternate weekends. Some laboratories have shifts, but few operate fully staffed night or weekend shifts.

Attrition and Turnover of Staff

The short work life and high turnover rate are the most notable features of the careers of laboratory technicians. According to our strong impression, only a small percentage of the technicians have been working at the same job for over five years. The age distribution emphasizes the relative youth of these workers.

TABLE 10
Laboratory Technicians by Age

18-22	23-27	28-32	33-37	38-42	43-47	48-52	53 plus	Total
26	44	19	11	10	6	7	8	131

[5]Brief of the Planning Committee for proposed Toronto Institute, *op. cit.*

A large group stated that though they had no immediate plans for marriage, they intended to leave their present jobs to travel and work elsewhere. The fact that technicians, like nurses, are in high demand in many parts of the world makes them a very mobile group.

The evidence indicates that few of the drop-outs will ever return to practise the occupation. The average work life of a qualified female R.T. is probably not more than five years. Consequently, the rates of return on the investment in their education are extremely low.

Opportunities for Advancement

Our findings suggest that if a technician continues to work in the hospital laboratory, her prospects for advancement are not bright. The number of supervisory posts or specialized technical positions which she can move into is limited and the range of salary increase restricted.

The salary schedules recommended by the CSLT document this fact. The recommended starting salary is $4,320 and the highest salary for an R.T., $12,000. There is a differential of only $1,200 between the recommended starting salary for an R.T. and an A.R.T.

A distribution of the actual salaries received by CSLT members in 1965 is even more revealing. The following table shows the range for Ontario members.

TABLE 11
Ontario CSLT Members by Salary, 1965

Salary Range	Number
$3,001 - 3,500	9
3,501 - 4,000	134
4,001 - 4,500	263
4,501 - 5,000	187
5,001 - 5,500	94
5,501 - 6,000	65
6,001 - 7,000	56
7,001 - 8,000	30
8,001 - 9,000	5
9,001 - 10,000	3
Total	846

SOURCE: CSLT Annual Report, 1966.

The median salary falls within the $4,501 to $5,000 range. Approximately 80 per cent of all salaries fall between $3,500 and $5,500. Indeed, 31 per cent fall between $4,000 and $5,000. This extreme bunching of salaries at the lower

levels graphically illustrates the fact that highly paid positions are scarce and therefore that advancement opportunities for those at the lower levels are restricted. For every position paying over $5,500 there are four people at lower levels waiting to move in.

Data from our sample further indicated that the ratio of supervisory positions to the total number of technicians is very low. Clearly the chances for advancement through promotion to a supervisory position are limited.

For the female technicians, the chances are even fewer. Although females outnumber males in the non-supervisory posts, the ratio for the supervisory posts for women is very low. Many of the administrators and medical directors of laboratories which we visited stated explicitly that they preferred men in these jobs.

Another obstacle to promotion into supervisory positions is the practice in Catholic hospitals of placing members of the religious orders in these jobs. This further decreases the opportunities for advancement of the lay technicians.

As noted earlier, the opportunities for advancement through taking advanced specialized technical training and moving into a more highly specialized job are limited also. Few such posts exist; and they seldom carry a substantial salary increase. Furthermore, as already noted, the opportunities for acquiring the requisite advanced training are slight.

All these factors contribute to placing a low ceiling on the technician's advancement. Once a technician has received her R.T. she has little hope of bettering her position substantially, even over the long run. She is slated to do the same kind of work at the same pay for much of her working life, should she choose to continue as a hospital laboratory technician.

Our interviews and questionnaires demonstrated an acute awareness by the technicians of these limitations. A part of the sample was asked specifically how they felt about the opportunities for advancement in their present job. Substantial numbers registered their dissatisfaction.

A reaction to the low advancement ceilings is manifested in several forms. Clearly, one of the major reactions is the desire to find a husband who will take them away from their jobs, or at least ensure that the job becomes less important to them. Another is the frequently evidenced tendency for the technicians to move to another job even if the salary increase is very small. A third reaction is that of a resigned acceptance of the job but indifference to the professional challenges it offers.

Indeed, the career patterns followed by laboratory technicians seem to fall into a few very broad types. There were a small number of male technicians,

usually chief technicians, who had made a lifetime career of laboratory work. Typically, they had entered a laboratory as "apprentice" technicians after a few years of high school. By dint of competence and sheer persistence, they gradually ascended to the supervisory posts. They have occupied these for many years and intend to continue until they reach retirement age. Sometimes they have strong ties of friendship and loyalty to the medical director of the laboratories. (In a few cases, they run their own private laboratories in their spare time, sometimes in conjunction with their medical supervisor.)

Similar to the pattern of the career men is that of the career women in hospital laboratory technology. They are, however, less frequently found in the supervisory posts. They are mainly older women, single, widowed, or with families long since grown up.

The great majority of the laboratory technicians fall into the next category. These are the young girls who become student technicians after leaving high school, as a temporary step before marriage. Many of them become engaged or married while still students. They work for a few years after receiving their R.T.'s, frequently moving about to see the world or to find husbands. After a few years of work they get married, have children, and retire permanently from the occupation.

A new breed of technician is making a timid appearance. These are men and women with university degrees, often postgraduate degrees, in science. They are hired for the new highly specialized research jobs in the bigger laboratories. Frequently they are imported from abroad. But once the immigrants get on their feet in Canada and discover the financially compelling alternatives to hospital laboratory work, they move away.

Chapter 3 The Heart Laboratory and the Clinical Investigation Unit

These units are unique cases because they represent rare research and experimental laboratories, rather than routine service departments serving the hospitals' everyday needs. Although similar units existed in our other large metropolitan teaching hospital, we sampled only two in Hospital C: the cardiocatheterization laboratory and the clinical investigation unit. No such special laboratories existed in the smaller hospitals in our sample. The following will outline briefly the nature of paramedical participation in each of these.

The Heart Laboratory (Cardiocatheterization)

Technical Work

Both research and clinical diagnostic work is done in the heart laboratory. The medical term for the work is "haemodynamics", and it deals with the normal and abnormal circulation of the blood. Haemodynamics is an extremely complex and delicate technical field on the borderline between medicine and electronic engineering. (In fact, the laboratory looks more like a computer centre than part of a hospital.) In essence, the main technique involves measurement of the flow of blood through the use of heart catheters and electronic recording machinery. A substantial number of the patients examined are those who have defects in their heart valves which cause a sanguine regurgitation.

The patients treated in the laboratory usually are referred by a cardiologist. There are fifteen cardiologists on staff at this hospital, including three specialists in haemodynamics. One of them is the director of the heart laboratory.

Three separate specialists are involved in the referral and heart surgery process — a cardiologist, a cardiac surgeon and a haematologist. Although each has a different responsibility, they all stay on the case throughout the process. Decisions about a heart catheterization and an operation are made by the three in conference.

The other members of the haemodynamics team are medical electronics technicians and specialized nurses. There are two of the former and four of the latter attached to the unit. In addition to these people, one radiology technician is attached to the unit at all times. There are two technicians qualified to do this work, and they alternate every three months. They are formally under the jurisdiction of the department of radiology.

The laboratory does approximately two to five catheterizations per week. The procedure itself involves intricate teamwork. The patient is given a local anaesthetic and the catheter tube, already tailored to the measure of this particular patient, is inserted into his heart from a vein in his arm. While his blood flow is being measured, he must carry out various exercises, such as peddling a bicycle machine. During this, the radiology technician must take x-ray movies of his heart. The doctors, nurses, electronic technicians and the radiology technician work together as a precisely drilled and coordinated team on this dangerous and complicated procedure.

The Work and Training of the Paramedicals

Medical Electronics Technicians

Medical electronics technicians are perhaps the rarest birds in the paramedical aviary. This is due partly to the very recent emergence of the equipment and the techniques for many of the procedures in which they are involved.

In this laboratory the technicians' responsibilities are several. There are three main aspects: procedures, maintenance and design. In the latter two areas, they handle practically all the electronic equipment in the hospital and are on call for this work most of the time. They are capable of working almost entirely on their own, without recourse to the manufacturer's service personnel. Among the items of equipment they service are the catheters, the heart-sound equipment, the ECG machines, the heart pump and the equipment in the intensive care and coronary care units. They will probably look after the electron microscope when it arrives. They also are apparently very ingenious at designing new combinations of equipment and putting the components together. We were shown a massive tape recorder which they salvaged from the hospital storage room and connected to the ECG equipment.

The medical side of their work involves several other procedures besides catheterizations. Animal research, in which heart pace-makers are inserted, and other heart-sound recordings on humans are two of these. Coronary angiograms are recorded. As for the catheterizations themselves, the technicians participate both in the preparation and in the actual examinations. Preparations involve the construction of tubes and catheters to fit the measurements of each patient. Considerable time must be spent to acquire the necessary finesse and knowledge to do this, and the medical director expressed great confidence in his technicians' competence. He feels that he can enter the operating room secure in the knowledge that everything will be perfect when he begins. The preparation also involves calibration and checking of all the electronic equipment, which they also monitor during the operation. After the operation, they transfer the sound recordings to paper. The technicians require a substantial amount of medical knowledge as well as knowledge of electronics. They must be familiar not only with sterile techniques

and operating procedures, but also with cardiology. According to the director, the technicians now can tell from their instruments what the diagnosis will be almost as well as he can.

Since there is, as yet, no training school in Canada for these people, they are drawn from many strange sources. When the medical director first established his laboratory, he tried one technician after another. They lasted anywhere from two days to three months. Finally, in desperation, he took on one of the hospital electricians. This man had very little experience in either electronics or medicine, but learned quickly. He was a keen individual, an immigrant endowed with curiosity, and with a natural talent for this specialized work. He subsequently took electronics courses from DeVry Correspondence College, and now is extremely competent in both the electronics and the medical work. He is clever at building new equipment and altering old equipment, and has become a skilled diagnostician. The second electronics technician also is a young immigrant. His work experience included a stint with an x-ray company, and with the engineering department at the hospital. He acquired some familiarity with heart laboratory work through voluntary attendance during some of its activities. He also is working out very well.

The director considers the shortage of electronics technicians as one of the main problems in haemodynamics work at the present time. After a basic training in electronics, one full year of on-the-job experience is required before a technician becomes fully conversant with the job. Some electronics technicians with experience outside hospitals cannot adjust to medical conditions — to the use of sterile techniques, to the patients, and to the teamwork required. As far as the director knows, the only place in North America that trains such people is the Mayo Clinic. He is anxious to start a training program at his hospital. He feels present personnel and facilities are capable of handling two trainees a year if they have a background in basic electronics.

Heart Laboratory Nurses

The nurses also require highly specialized skills similar to those needed in a conventional operating room. Apparently considerable time is required to learn this speciality.

The nurses are concerned mainly in helping during the operations and setting up for them. They prepare ("prep") the patients, assist in the operation, and wash their own instruments afterwards. They take part also in the construction of the catheters.

The nurses face problems due to lack of recognition of their special capabilities. They have trouble obtaining extra staff, and therefore have to do cleanup work which they feel is a waste of their professional time.

The Clinical Investigation Unit

This type of research operation, like the heart laboratory, is confined to large teaching hospitals. Although units of this kind account for a relatively small proportion of all laboratory technicians, they are significant as examples of the most advanced and highly specialized frontiers of medical science. Aside from the work they do, the most important features of the paramedical personnel in these units are their diverse backgrounds and the modes of recruiting them to the work. The units are so new that there are no traditional sources of supply and no training programs for their auxiliary staff. Consequently, the paramedical staff are very heterogeneous.

Organization of Work

Technical Work

The clinical investigation unit provides specialized treatment and undertakes research on patients with endocrine and metabolic disorders. The unit has eleven beds on one floor, a laboratory on a second floor, another small laboratory in a research building a mile away, and three offices for the doctors associated with the unit. The small laboratory also has offices for two medical assistants.

One of the doctors specializes in endocrinology and one in gastroenterology. Each doctor has some separate facilities. The director's specialty is lipids and carbohydrate metabolism. Four other physicians also work in this area. They include an Egyptian doctor who works full time; one part-time man; one interne; and one research fellow who was to come from Argentina in the fall of 1967.

The unit carries on research, provides treatment, and investigates the effects of new drugs. The essence of the work is an intensive observation of patients who are kept in the unit for a long period of time. They are all chronic cases; no acute cases are taken into the CIU. During their stay, patients are subjected to a rigidly observed routine, which must not be allowed to vary in the slightest detail from day to day. Their diet, their exercise and their sleep must be tightly regulated. Everything they eat is carefully prepared and measured, and all their excreta — urine and feces — must be collected, measured and tested. Sometimes even their sweat is collected and tested. The unit has its own kitchen with two full-time dietitians. This routine requires the greatest precision and care on the part of the nurses and technicians. One small error in measurement can upset a whole experiment. Staff who have the necessary qualifications are extremely difficult to find.

The Paramedical Staff: Authority and Supervision

The paramedical personnel are a strangely assorted group. They include two secretaries, who double as technicians occasionally; a biostatistician; a part-time biochemist; a technician with a B.A. in biochemistry; and another technician with a degree in chemical engineering from Hungary. There are also six specialized nurses

and two full-time dietitians, as previously mentioned. In addition the unit makes use of the services of social workers, physiotherapists and occupational therapists.

An organizational chart of this unit would be rather unusual. The nurses and the dietitians are the only groups who follow a regular, consistent routine. The steps are laid down by the medical director, who sets the protocols for each of the patients to follow.

There is one head nurse who works alongside the other five nurses and supervises their work. The protocols for patient treatment are written out in advance in day-by-day, hour-by-hour detail. Nurses who will both adhere to this schedule and faithfully record their activities are hard to obtain. It takes a special kind of person for this work, and a long period of acclimatization. The head nurse in particular needs to be especially bright and careful. She needs a mind which can cope with mathematics, because she is always working with fractional doses.

In fact, all the nurses must have an almost obsessive concern with detail and a flair for the technical, as opposed to the "tender loving care", aspects of their craft. The director has had some disagreements with the nursing administration over this matter. The latter does not seem to realize the special abilities required and often sends unsuitable people to do the work. Consequently, there is a high turnover of nurses in the unit, and the director is struggling constantly to obtain and retain suitable staff.

As mentioned above, the unit has its own kitchen and dietitians. It also has its own serving girls. The dietitians are highly specialized. One is in the CIU full time, the other is a research dietitian. Each meal for the patient's entire stay must be made up in advance from food taken from the same lot. For instance, if peas were on the diet, they would have to come from the same case. Each meal is prepared in advance, measured, blended, then frozen and individually stored.

The technicians on staff work largely on their own on separate projects or as assistants to the doctors. One woman is the director's private secretary. She handles all his administrative work and, as is common in most research groups, she also is partly a technician. She does key punching, draws diagrams, and does other statistical work. The other secretary is in a somewhat similar position. She was originally a medical stenographer. Now she is an artist, a typist and a biostatistical technician. She does the legwork on many of the IBM operations. She has seventeen years experience here. The biostatistician is an assistant professor in a School of Hygiene, who spends half a day a week as a consultant with the CIU. The part-time biochemist, who has an M.A. in science and also does research in the biochemistry department, works part time on lipid chemistry for the unit. Her salary is paid partly from the director's research grants. A technician will be hired in the fall to work with the biochemist. She is a recent R.T. graduate from this hospital. The other biochemist immigrated to Canada from Yugoslavia. She has a

Canadian B.A. in biochemistry. She works on carbohydrate metabolism — more specifically, on insulin antibody assays on diabetic patients. The director hopes to hire another technician to do the routine chemistry, thus giving this woman more time for development research. The research fellow from Argentina will work on the same problems. The woman with the chemical engineering degree from Hungary also works on lipid metabolisms, but on a different project and in the more distant laboratory.

Staffing the Unit

From the foregoing it is apparent that there are at least three different kinds of "technicians" working in this unit.

The secretary-technicians primarily require a medical secretary's knowledge of typing and terminology. But they also must be familiar with elementary data processing techniques and equipment. Moreover, they must have some of the skills of a medical illustrator, and they must learn how to conduct biochemistry tests and measurements. The two secretary-technicians in this unit acquired the latter three components of their skills and knowledge on the job. It is hard to envisage any other way in which such a disparate bundle of skills could be taught or learned.

This unit employs one technician with a Master's degree in science, and two with Bachelor's degrees. They work independently; the medical director assigns a project and then leaves them to execute it. Technicians of this kind are hard to obtain because the salary rates are low. In order to attract them at all, the hospital salaries must be supplemented by money from research grants. (The same salary problems affect the hiring of doctors. This work does not pay enough to attract Canadians. The majority of fellows, therefore, are from the developing countries. They have no licence to practise medicine here, but they almost always want to stay.)

Having obtained these high-priced, university-trained technicians, care must be exercised not to waste their time on menial, routine work. For this reason, the hospital has hired a third variety of technician — two R.T.'s — to assist them, The director claimed that, for this type of work, an R.T. has no advantage over a bright high school graduate. It takes about the same length of time — up to a year — to train either an R.T. or a high school graduate for these particular tasks. The routines of this laboratory are all entirely different from the training the R.T.'s receive. Their only advantage is the ability to handle a pipette.

It is interesting to note, however, that despite these claims of the equal value of high school and R.T. training, the director has hired two R.T.'s for this job. At least one of them was trained in his hospital.

While it would be rash to generalize about such units from the study of one unit, there does appear to be a fantastically wide range of technical and academic skills required to carry on this specialized aspect of the work of the hospital.

Chapter 4 Inhalation Therapy Technicians

Numbers and Importance

Although most of the tasks that presently comprise the job of inhalation therapy technicians have existed for some time in hospitals, the occupation itself is a relatively new one. In fact, only two of the five hospitals in our sample had an inhalation therapy department and employed inhalation therapy technicians. The others still left this work in the hands of oxygen orderlies and nurses.

The history of the Canadian Society of Inhalation Therapy Technicians reflects the novelty of the occupation. It is still relatively weak and disorganized, and its training programs are diverse and rudimentary.

Organization of the Departments

Technical Work

The tasks of the department can be broken down into four main types:

Administering treatments
Doing the rounds (checking equipment on the floor)
Repairing and cleaning the equipment
Pickup and delivery of equipment.

Administering treatments. The treatments are called intermittent positive pressure breathing. They are a relatively new therapy for pulmonary patients, not widely known or used by the doctors. Basically, the treatments consist of forcing the patient to breath a gaseous mixture in a certain rhythm by the action of a respiration machine. The patient is usually given fifteen-minute treatments four times a day. These treatments must be prescribed by doctors. At Hospital B, nurses mix the chemicals for the machine and supervise the treatment. The number of patients receiving treatment is small; apparently it varies by the season and by the awareness of the doctors. Only one or two patients a day were receiving treatments at Hospital B when we visited.

Doing the Rounds. At any time, there are a considerable number of oxygen tents, humidifiers and other inhalation equipment in use on the wards of the hospital. Twice a day, one of the I.T. technicians goes around the wards checking all the equipment to make sure it is working satisfactorily. Common sources of problems are leaks and "tinkering" by other staff. The technician on the rounds locates the faulty equipment and has it sent down to the central room for repair or readjustment.

Maintenance, Repair and Cleaning of Equipment. Besides the machines needing repairs, all other equipment is checked and serviced as a matter of routine in the I.T. department. All the oxygen masks, tents, and other equipment which come in contact with the patient must be cleaned, if not sterilized. At Hospital B there are as yet no hot sterilization facilities. The cold sterilization operation involves washing and rinsing in special solutions.

Pickup and Delivery of Equipment. This is the original core function of the unit. Technicians answer calls from the floor, take up the required oxygen masks and tents or the humidifier equipment, and bring them back when their use is discontinued. There is a strong element of emergency in much of the work. In the case of a cardiac arrest, the therapist must rush to the floor where the doctor or nurse is waiting. Someone must be on standby in the department at all times to answer calls. The following is a list of the equipment used by the department:

A: respirators, ventilators, oxygen tents, croup tents, nebulizers, humidifiers, regulators and flow meters, respirometers, analyzers;
B: repair tools, connecting tubing and fittings, gas cylinders.

Most of the equipment in List A involves the use of gases. The combination of inflammable gas and electrical equipment introduces an element of danger to the work of these therapists. Currently items of electronic equipment are being introduced. So far none of the equipment is particularly difficult to repair and adjust because there is no complicated circuitry involved. Presumably the mechanics of it can be quickly learned from manuals or from an instructor, since the mechanical principles involved are very simple.

There is notable homogeneity of the tasks which constitute inhalation therapy. Pickup and delivery, and to a certain extent, maintenance and repairs were the traditional core tasks of the oxygen orderlies. This was delivery boy and amateur mechanical work. Cleaning, although probably delegated to orderlies and aides, was done in a haphazard fashion by the ward nurses.

The most interesting field concerns the treatment function. This seems to overlap doctors' and nurses' prerogatives. So far, there is considerable variation in the extent and nature of I.T. technicians' contacts with patients, as we shall see in examining procedures in Hospitals A and B.

Administration of treatment seems to be the main wedge used by the I.T. technicians in their drive for status. In the U.S. apparently, treatment is the main function of the more professionalized I.T. technicians. There, it is reported, they even administer treatments in the home to outpatients.

Hospital A

Although this hospital is considerably smaller than Hospital B, it has more than twice the staff. The staff consists of a chief technician, who spends most of his time

on supervision and special technical work; his assistant, who is also a registered inhalation therapy technician; plus four non-registered but experienced technicians; and five students. This makes a total of eleven on staff. The students started training in January 1967. The assistant chief conducts most of the training. After three and a half months the trainees are put on regular shift work. Two more students were to be accepted in September 1969. Even so, the chief feels that his department is still understaffed. All of the present and prospective employees are men, but this is coincidental.

The chief technician has been at this hospital since 1966. He was hired, in part, to reorganize the inhalation therapy department. When he arrived the staff consisted of four oxygen orderlies, with an average of three or four years' experience. They came under the jurisdiction of the head orderly. At that time their functions involved mainly the delivery and pickup of oxygen tents; they did not repair or service equipment. Equipment was either sent out for service or, in most cases, used until it wore out and had to be replaced.

The chief has had a free hand in planning the expansion of the department. It will move to new quarters, two and a half times as large, in the near future. However, even their present accommodation seems luxurious in comparison to that of the inhalation therapists at Hospital B. The new facilities will include a separate repair shop, disinfecting room and storage area.

The unit is responsible directly to the assistant administrator and hence is not to Friday there are four people on the day shift, two on the evening shift, and one on the night shift. Weekends, there are two people on days and one person on the evening and night shifts. All staff rotate through these shifts. They also rotate through the four functions of the unit, spending one week on each.

The unit is responsible directly to the assistant administrator and hence is not under the pharmaceutical service or anaesthesia, as in some other hospitals. The chief technician in the department of inhalation therapy emphasized that his men do not take orders from the nurses — only from the doctors. Unlike Hospital B, the technicians, not the nurses, mix the drugs, Indeed, on occasion, the chief even has the doctor's prescription altered, if he feels it is incorrect. The I.T. department has a medical advisor whom the chief telephones in these instances. This doctor may countermand the physician's prescription and issue a proper one. Improper prescriptions sometimes result because as yet the doctors know little about inhalation therapy. Overdoses are often prescribed, especially by new internes.

The routine work is much like that in Hospital B (see below). The difference between the two hospitals is that the I.T. technicians have considerably more autonomy in Hospital A. They do not take orders from the nurses but follow the doctor's prescription. They administer the treatments and record them on the patients' charts themselves. Teamwork occurs only in cases of cardiac arrest and

in the intensive care unit. In respiration treatment, the technician teaches the patient what to do in the first treatment and stands by while he does it in the following treatments. The chief technician himself has some special skills including pulmonary function, examinations and cardiocatheterization work. He is teaching the former techniques to his students. They involve tests of lung volume and are used as preoperative measures to check lung capacity in case of exision, and as diagnostic tools. In these tests, the chief takes a paper tracing and interprets it to the physician.

Hospital B

The history of the department as an independent unit is short — one year. Before this, its tasks either were performed by various other groups or were not yet in existence. Oxygen orderlies or male nursing assistants picked up and delivered oxygen tents and other equipment. Presumably the nurses and the oxygen orderlies administered the treatments with the machines. The nurses did a haphazard job of cleaning the equipment on the floor. The equipment was not systematically maintained. The two new functions of inhalation therapy — i.e., pulmonary function studies and intermittent positive pressure breathing treatments — were either not done at all, or done sporadically by doctors, nurses or orderlies. About two years ago the hospital obtained a registered inhalation therapy technician. He trained the present supervisor who was formerly an oxygen orderly. When the present supervisor was appointed head technician, the department was organized as a separate entity. He inherited some rundown equipment, no staff, and a pipe-festooned room in the sub-basement.

The new chief set out to reorganize the unit. He recruited three students and began to train them. The facilities of the downstairs room were improved; running water was put in so that cleaning and cold sterilization were possible. Gradually the old equipment was phased out and new equipment purchased. With a registered technician in charge the new treatments were introduced on a systematic basis. An orderly division of work and a shift system were devised.

But the chief has plans for still more changes. More space is needed: a room for treating outpatients, better storage rooms and better cleaning facilities. And, most of all, more students are needed to provide staff for a night shift.

The formal organization of the unit is easy to describe because of its small size. However, let us locate it in the total organization of the hospital. The unit comes under the department of nursing. The chief technician reports directly to the associate director of nursing. He meets her and makes a report once a week. She checks his budget. She has a general idea of the work of the unit but does not know the technical details. On the wards, the nurses watch the technicians closely. Technicians do what nurses tell them from the moment they arrive on the floor.

Internally, the chief is in charge both of the work of the unit and of the training program. He has three student technicians and one technician's aide working for him. The students have been there for approximately a year and a half and have about another six months before writing their examinations. The chief technician is in continual close contact with the students, although not on night and weekend shifts. For the first five months, all their on-the-job work is very closely supervised; after that, there is little need of supervision. Apparently, the doctors and nurses do not really supervise — "They don't know anything about it."

At present, the allocation of tasks is rather unorganized because of the shortage of staff. This contrasts with the situation at Hospital A where there is a clearly worked-out division of labour and a rotation scheme.

The regular day shift begins with all the technicians going to the wards to check for faulty equipment. This takes about one and a half hours. If there is anything to be repaired, they bring it down to the department and fix it in the next half hour. If it is a more complicated piece, such as a respirator, the repair could take several hours. The students are capable of repairing most of the equipment, but the chief himself handles the tricky work.

After the repairs are finished the technicians remain in the department waiting for calls from the nurses requesting equipment to be brought and set up, and to be returned. Many of these calls are emergencies — for example, cardiac arrest cases. If only one technician is on duty, this keeps him hopping throughout the day. If the technicians have any free time, they are supposed to spend it reading or studying. There is also the cleaning and cold sterilization to be done.

In the regular routine, the last hour of the day, two days a week, is devoted to a formal lecture by the chief or to an instructional film.

At present, there is no night shift because of the shortage of staff, although there are evening and weekend shifts. One person is on duty at these times. Both the students and the chief stand these watches.

The chief, of course, has some extra responsibilities. One of the most demanding of these is teaching. He must teach not only the practical parts of the technical work, but also the theory of anatomy, physiology, and so on. This means that he must bring himself up to date on these subjects by reading the latest textbooks and adapting lectures from them. These duties take up to a third of his work time during the "school year". He also occasionally gives lectures to physiology students and student nurses. Another extra duty is the ordering of supplies through the hospital receiver. Besides the short-term ordering, he makes up the annual budget and estimates next year's needs.

His supervisory duties involve checking the repairs, keeping the repair records,

setting up the time sheet and the general supervision of all activities. In addition, he carries a heavy load of routine work: he goes on rounds, does the tricky repairs on such items as high pressure regulators because of the explosion hazard, initiates treatments on new patients. Because of the shortage of staff, he takes his turn on evening and weekend shifts.

Staffing the Departments

Because this occupation is so new and because the occupational association is so young and weak, the responsibility for recruiting and training inhalation therapy technicians still rests primarily with the individual hospital. The fact that the OHSC does not recognize this as a separate specialty, and does not provide a separate allowance for it in its grants system, also impedes the creation of inhalation therapy departments in many hospitals. The absence of provincial standards and inspection also holds back the setting up of uniform training and certification arrangements. The Canadian Society of Inhalation Therapy Technicians now has established a syllabus of study and sets examinations for admittance to the occupation. However, neither of the two hospitals in our sample which train I.T. technicians adhered very closely to the syllabus. Apparently, in the past the didactic parts of the course were given at one central location in Toronto. Last fall, this idea was reintroduced.

In western Canada, apparently, the standard of training is much superior. It was reported, for instance, that there is an institute of technology in Edmonton which serves as the training centre for the entire province and gives a very high quality training. The medical faculty at the University of Alberta maintains close ties with the school. One chief technician stated, however, that he would not hire graduates from the west. They are overtrained for the type of work being done at his hospital. Also, it is cheaper for the hospital to hire and train students than to hire experienced technicians.

In the hospitals in our sample, the recruiting and qualifications of I.T. technicians reflect the origin of this group as oxygen orderlies. Many of the present I.T. technicians were oxygen orderlies before they became inhalation therapy technicians. Now, however, people are being hired directly to train for inhalation therapy technician jobs, rather than being upgraded from oxygen orderly. The following section outlines the qualifications of technicians for the training programs, the recruiting practices, and the career patterns of technicians in two of the hospitals in our sample.

Qualifications of Inhalation Therapy Technicians

The most remarkable point about the personnel in this occupation is the fact that they are predominantly men. This is in sharp contrast to the situation in most other paramedical occupations. Indeed, in our small sample, there was not one female inhalation therapy technician.

They were, on the whole, younger and less well educated than the other paramedical groups. Three out of eight were born outside Canada. Most of those interviewed had obtained certification from the CSITT or were in the process of doing so.

Formal Training Programs

Hospital A. The training program, which is unique to this hospital, is the proud creation of the chief technician. It consists of an improvisation on the CSITT syllabus to fit the exigencies at this particular hospital.

For the first three weeks, the trainees are not on the hospital floor at all. After the three months' theoretical training, they spend four weeks "trailing" one of the experienced technicians in his daily rounds. After this, they are allowed to work completely on their own, even on the night shift. The training program is carried out entirely by the chief technician and his assistant. Lectures are given by medical men only at the monthly meetings of the Eastern Ontario Chapter of the Association. As in Hospital B, this places a tremendous burden on the supervisor because he must ingest and regurgitate the most up-to-date general medical knowledge, as well as teach the practical techniques.

There were five students who were to write their registration examination in the fall of 1968, as well as a non-registered technician who planned to do so on completion of the necessary residence requirements. This technician had the requisite educational qualifications — Ontario grade 12. The two students scheduled to start in the fall of 1969 will take their theory at the new Algonquin Institute of Applied Arts and Technology and do their internship at both big Ottawa hospitals. While in training the technicians are paid union scale for orderlies — from sixty-six dollars to eighty-one/fifty per week. The non-registered technicians are also paid the union scale for orderlies. This amounts to much more than student technicians in the laboratories and radiology receive.

Hospital B. To date, the chief technician has done almost all the teaching of the students in much the same way as he received his training from his predecessor. In 1968 a new central school was opened at another Toronto hospital. This will bring many student technicians together for didactic lectures on basic subjects like anatomy and physiology. The chief technician greets this with enthusiasm. Until now he has worked systematically through the syllabus put out by the Association. He prepared practically all the lectures from scratch. He has had to read various manuals and texts and extract the relevant materials from them. By his own admission and that of his students, this has been a rough-and-ready approach. Many of the prepared materials were rather makeshift. However, the practical training seemed adequate. The difficulty in getting doctors and other teachers to give lectures to such a small, insignificant group is deeply regretted by the therapists.

Recruitment Practices

There is little to say about recruitment policies and practices. It seems that the prevalent practice is for a hospital to hire an experienced registered technician to establish a program for training its own technicians. So far, there is little hiring of fully trained technicians from other centres. Of course, one good reason is that there are very few registered I.T. technicians on the market. Another reason advanced by one chief technician was that some registered technicians, especially those from western Canada, were "overtrained" for the type of work being done in his hospital and, hence, demanded too much money.

Apart from the technicians who have been upgraded from oxygen orderly jobs, the typical recruiting pattern seems to be that the hospital administration selects certain people with the requisite educational qualifications from the applicants for orderly jobs. They are offered the opportunity to train as I.T. technicians instead.

At Hospital A both the chief technician and his assistant had been trained at another local hospital and had been lured away by higher salaries. Apparently, the latter hospital has provided, against its will, a fair number of experienced technicians who become heads of departments in other hospitals.

Neither Hospital A nor Hospital B has any explicit policy with regard to hiring women as I.T. technicians or trainees. The chief technician in Hospital B was rather opposed to the idea, because of the hard physical work and the rough-and-ready atmosphere of the department. The chief at Hospital A has been trying to hire some girls, but none has applied so far.

From our evidence, it appears that recruitment is mainly from the local labour market. There appears to be little interregional or international mobility of the kind that characterizes many of the other paramedical groups.

Career Patterns of Inhalation Therapy Technicians

There is a sense of opportunity in this occupation which contrasts sharply with the feelings of many technicians in the other paramedical occupations. Two reasons come to mind. One is the novelty of the occupation; the other, the fact that most of the people in it are men.

The first factor influences career orientations in the following way. There are at present so few registered I.T. technicians and the demand is so high due to hospitals setting up inhalation therapy departments that the job opportunities seem limitless. Not only are technicians' jobs easy to find, but so, also, are supervisors' jobs. In fact, a large proportion of the I.T. technicians and students interviewed expected to be department heads in the near future.

Besides the availability of good jobs, the "professionalization" of the occupation is conducive to optimism. New complex techniques are being introduced as part of the inhalation therapy technician's work. The giving of treatments is a key case in point. This almost borders on a medical prerogative. Undoubtedly, the lure of professional prestige, and the possibility of lucrative and independent private practice add to the prevalent optimism.

The fact that most I.T. technicians are men also influences career orientation. They realize that they have to support families and, for the most part, they intend to make a lifetime career of their work. This lends determination to their efforts to upgrade their occupation and the advancement opportunities within it. As yet, wages are quite low; but there seems to be a good chance that they will be raised as the occupation gains acceptance at more hospitals. Even now, the pay for trainees is considerably higher than that for trainees in other paramedical occupations. In addition, most of the men have risen from being orderlies; they have tangible experience of upward mobility and the taste for more of it. Altogether, the novelty of the occupation and the predominance of men in it leads to an active, positive attitude towards careers, in contrast to the almost fatalistic resignation which the girls in other departments develop on being exposed to the low horizons in their field.

Chapter 5 Radio-Isotope Technicians

Numbers and Importance

The work of a radio-isotope unit is a specialized form of diagnostic radiography; it employs radioactive materials in both diagnosis and treatment. For example, a scanning machine will "read" for abnormalities an organ which has been injected with an isotope. A frequent treatment is thyroid bombardment — i.e., bombardment of the thyroid gland to cut down its activity.

The use of radioactive materials in medicine emerged prior to World War II but did not develop markedly until the end of the 1940's. Departments mentioned in this report have been established only within the last twelve years. This, then, is a very new and exciting field in which growth has been rapid and piecemeal. At first hospitals were concerned primarily with thryoids and haematology; now almost all the main specialties in medical treatment are concerned.

There are several reasons for such rapid growth. Medicine has become more aware of the unique possibilities of these scans as diagnostic tools. As confidence is gained about the uses of radioactive materials, enthusiasm about extending their uses has followed. As the equipment is automated and simplified, it is coming within the reach of smaller hospitals. And the public is gradually being educated.

There have been several consequences of this expansion. Additional staff have been necessary and, since no schools as yet exist to train them, training procedures have had to be devised on the job. Certain patterns in the division of labour have evolved, but the departments do not necessarily "match". The success of these treatments has increased the demand, and has therefore increased the need, for careful screening of patients. For example, similar symptoms are displayed by a malfunctioning of the thyroid gland and a side effect of "the Pill". Problems in staffing also have arisen. Nuclear medicine is a brand new specialty and, as such, draws interested specialists from other fields. It is still not recognized as a separate field in undergraduate medical education.

There is, as yet, no association for nuclear medicine technologists in Canada, such as there is in the United States. Meanwhile, the Canadian Society of Radiological Technicians is trying to take the isotope people under its wing. Two years ago it organized a nuclear medicine branch for this purpose.

Organization of the Departments

Size and Composition of Staff

Hospital A — 600 beds
medical director
2 senior technicians
junior technician

Hospital B — 800 beds
medical director
chief technician (B.Sc.)
R.N.
radio-isotope technician
laboratory technician
secretary

Hospital C — 900 beds
medical director (plus 2 fellows: x-ray, research)
2 R.N.'s
laboratory technician
secretary

Hospital D — 300 beds
medical director
chief technician (R.N.)
assistant technician (R.N.)
secretary

Hospital E — 200 beds
no department

Levels of Authority

In each of the above cases, the medical director is ultimately responsible for the work done in the department. Each staff member thus is responsible to him. When a chief technician has been designated in a department, he or she acts as formal liaison between doctor and staff, and another level of authority emerges. In practice, however, the various members in a radio-isotope department usually work together on a more or less equal level, since each does work of his own in a specific area.

Characteristics of Work Situation

Technical Work

As a diagnostic tool, radio-isotope work is simple and without danger or discomfort to the patient. It involves simply an injection of a particular isotope, a waiting period (perhaps a day) and the organ-scanning process itself. During this process

the patient is required to remain completely still for a period of from fifteen minutes to an hour or more, depending on the type of scan. It may be necessary to repeat the scan from more than one angle.

There are several types of scanners, but all pick up the radiation given off by the living cells in the organ and record it. Damaged or infected areas show up clearly by this method, though interpretation is difficult and only a few doctors are qualified in this field. The scanning machine may record the examination on a film, much like an x-ray (linear scanning machine), or may (as at Hospital C) act more in camera fashion, producing small polaroid pictures which are later enlarged (gamma ray scintillation camera machine).

Among the organs most commonly scanned are the thyroid gland and the brain; the kidneys, the liver, the spleen, the lungs, the placenta (for localization) also are scanned. Hospital D had done some ninety-three cases of thyroid bombardment since the department was set up three years ago. This is an unusually high number; it reflects the fact that the northern part of Ontario lacks any iodine in the water or soil.

Chemical tests are carried out in those radio-isotope departments which are equipped with a laboratory area. Blood tests, tests for thyroid function and hormone level, and the binding of the thyroid proteins are tests commonly performed in these laboratories. Many of the tests are very complicated and may involve a full day's work.

In addition to the chemical tests, the injections and the scanning procedure, complete records must be kept of every case, and the films or polaroid pictures must be developed. At Hospital B, the technician (formerly an x-ray technician) takes the films to the x-ray department where she develops them herself.

Work Flow

Both inpatients and outpatients utilize the radio-isotope departments, though most users are in the former category. Hospitals without radio-isotope facilities send their patients to those which are equipped. Hospital C, for example, receives patients from a number of other hospitals in the Toronto area. Approximately ten to thirty patients are seen daily in the hospitals studied, depending on the size of the hospital, the staff and facilities.

Requisitions are sent from the floors to the department, where they are sorted and recorded. In some cases, a doctor may telephone in directly to request help in deciding what to order. During sorting, any unnecessary referrals are weeded out ahead of time by the doctor in charge. The staff members usually arrange their own timetables and call for the patients.

Specialization and Division of Labour

Since staff members come into this area after receiving training in another field, a complex division of labour can occur, as a result of the variety of education and backgrounds. At Hospital B, for example, the R.N. gives the injections, the former x-ray technician does the scanning and film-developing, and the laboratory technician (who also has a degree in pharmacy) does all the chemical work. The chief technician, who has a B.Sc. in chemistry, occupies a supervisory position and acts as a float, since she formerly had to manage all the aspects of the work. The medical director is responsible for administration, training, and interpretation of scans. This seems to be the general pattern which evolves with the addition of specialized staff. Where there are no nurses, the doctor gives the injections, as at Hospital A.

These functions do overlap, however. Usually the staff help each other out, and they must necessarily coordinate their work efforts. At Hospital C, even the secretary is prepared to help out with the technical work if required, since she helped the medical director set up the laboratory in the beginning.

It might be stated, then, that the various different staff members "specialize", in a sense, in one area of the work. It is usually only the medical director, however, who has a real specialization in the area of nuclear medicine. The medical director at Hospital B, for example, specializes in endocrinology. Further specialization within the field seems inevitable as nuclear medicine establishes itself more firmly.

Supervision and Control

As yet there are no formal procedures of control or supervision. Each person works fairly autonomously. However, informal controls are continually in evidence, since each person's work depends on that of another, and the ultimate results are subject to the director's careful scrutiny. Also, since most of his staff have been trained by him specifically, he is quite aware of their abilities and limitations.

Role of Occupational Association

Since staff have such diverse educational origins, few of them belong to the same professional association. There seemed to be little strong feeling about the need for one specifically for radio-isotope technicians. Predictably, the various associations have no influence on the work situation.

Staffing the Departments

Qualifications of the Staff

As has been indicated, it is difficult to obtain staff with the "right" qualifications. In fact, there seems to be no agreement on what the "right" qualifications are.

The chief technician at Hospital D, for example, felt strongly that nurses were the best people for the job. They are legally permitted to give injections and, she felt, they accept discipline more readily, are more aware of cleanliness, and have more respect for radioactivity. The medical director at Hospital B, on the other hand, felt the leaders should have a university degree while the technicians themselves need possess only certain attributes of personality — such as "niceness". In any case, Canadian-trained people are scarce, since there are few training centres (one of these being the Royal Victoria Hospital in Montreal).

Training

Training has yet to be properly formalized. For the technician it usually occurs on the job, following training in some other areas — such as laboratory technology, radiology, nursing. An average of six months seems to be necessary before a technician is capable of working without close supervision. Technicians may have taken certain other courses; a senior technician at Hospital A was the first non-M.D. to take a course in nuclear medicine at Ann Arbor; and the chief technician at Hospital D took several lectures in nuclear medicine at the University of Toronto, and learned how to operate the equipment at Hospital B. Even the medical director at Hospital A had to start from scratch. He had taken a course at the University of Toronto, and was continuing studies at the Princess Margaret Hospital (Toronto) at the time of interviewing.

Recruitment

Patterns of recruitment are similarly unstandardized. Nurses may apply because of more regular hours, or because the medical director knew them and asked them to join his staff. Others may hear through the hospital grapevine that there is a vacancy. Some advertising is done.

No generalizations can be made at this point about all radio-isotope technicians, except perhaps to indicate that the tendency here, as in most other paramedical fields, is for the large majority to be female. This follows from the fact that in Canada most nurses, laboratory technicians and radiographers are female. Perhaps if formal training programs are instituted, more men will enter the field. Age varies considerably since each has usually had work experience in some other area for a number of years.

Job Satisfaction

All respondents seemed quite satisfied with their jobs, probably because they had chosen them and wanted them, not because they had to have a job, or had to earn a salary. Salaries vary from $4,000 to $5,000 for the former laboratory technicians and radiographers, and $5,000 to $6,000 for former nurses. The

chief technician at Hospital D earned between $6,000 and $7,000. None expressed dissatisfaction with salary except the chief technician at hospital B, a B.Sc., who was earning between $5,000 and $6,000.

Here again it was the older, unmarried women who were much more career-oriented than the younger girls. The work does seem to give some scope for interest and new learning since innovations are always possible. Few had any major complaints — hours are regular with no overtime as a rule; working conditions are congenial.

Chapter 6 Radiology (X-Ray) Technicians

Numbers and Importance

As have the other paramedical fields, radiology has grown considerably in the last few decades. Among the reasons for this rapid growth record are the utilization of hospital x-ray departments by ever-growing numbers of outpatients; the development of new equipment capable of more complicated work; the development of new techniques and special procedures (e.g., arteriograms, heart catheterizations, neurograms) which, in the larger urban hospitals at least, are becoming more and more routine. In short, the uses of radiography have multiplied for diagnostic and therapeutic work since x-rays first came into use. Not only has sheer volume increased, but new specializations have evolved, such as the x-ray technician assigned only to the cardiovascular room, or the x-ray nurse. Volume, of course, has necessitated more staff at all levels — administrative, medical, technical, clerical. In some cases, specialties have evolved to help share the increased work load. Formally, all x-ray technicians are trained and expected to be able to handle all types of x-rays, patient care, and developing of film. Yet, as some departments have greatly expanded, "x-ray nurses" have been added in varying numbers (from one only to a whole team under a head nurse) to set up for special procedures, assist the radiologists, and help in patient care. And, too, most x-ray departments have at least one darkroom technician responsible for the development of the films. One hospital (C) also has a clerical staff for its x-ray film library.

The need for more staff, and often for better trained staff, has in turn affected training programs. Within the last several years, some hospitals have combined their training courses, and plans are underway for a centralized school in Toronto.

Increased personnel in these occupations has had consequences for the Ontario Society of Radiological Technicians and the Canadian Society of Radiological Technicians as well. The Ontario Society, originally set up for educational purposes, has been forced more and more into consideration of salaries and working conditions. As will be seen, its form and structure have not been adapted as yet to these new purposes. Not being a union, it lacks the power (and support) to effect actual changes in salaries and working conditions.

Organization of the Departments

Size and Composition of Staff

It should be noted that the following figures reflect the situation at the time of

interviewing, in the summer of 1967. In several cases additional staff have no doubt been added because of increases in the work load in general, and because the summer holiday period is over.

Hospital A — 600 beds
Total staff approximately 52
chief radiologist
2 other radiologists
6 residents
chief technician (nun)
technical supervisor
mechanical supervisor
director of studies (nun)
15 senior R.T.'s (radiological technicians)
5 junior R.T.'s
7 students
3 darkroom technicians
1 aide
6 to 10 clerical staff

Hospital B — 800 beds
Total staff approximately 57
chief radiologist
5 residents
5 internes
chief technician
13 R.T.'s
13 students
chief cardiologist plus senior technician
head nurse
5 R.N.'s
5 nursing assistants
2 male nursing assistants
4 clerical staff

Hospital C — 900 beds
Total staff approximately 61 (plus students)
medical director
6 radiologists
1 resident
6 senior internes
1 technical director (nun)
2 assistant chiefs
head supervisor

8 supervisors (senior R.T.'s)
17 R.T.'s
students
2 R.N.'s
1 orderly (film library)
3 processing technicians (film library)
4 orderlies and porters
8 clerical staff

Hospital D — 300 beds
Total staff approximately 27
6 radiologists
chief technician
assistant chief technician
7 R.T.'s (one of these part-time; one on call weekends only)
7 students
1 darkroom technician
1 orderly
3 clerical staff

Hospital E — 200 beds
Total staff 9
1 radiologist
1 head technician (R.T.)
3 R.T.'s
4 students
clerical staff

Levels of Authority

Some idea of the number and diversity of levels of authority has been suggested by the foregoing staff lists. The most obvious differences reflect differences in size of hospital. Generally speaking, the size of the department and the number of levels of authority within it roughly reflect the size of the hospital in terms of number of beds. It would appear, however, that they may relate to such other factors as the number of students that can be accommodated; the existence of additional or parallel positions for nuns in some of the Roman Catholic hospitals; the general importance attached to x-rays by the hospital itself; the addition of extra subdepartments such as x-ray nursing, or a film library.

The ultimate source of authority in each department is the chief radiologist. In theory, every other member of the department is responsible to him. In practice, however, there are several general levels of authority and, within each, a hierarchy of authority and responsibility. The basic distinction is that between medical and technical. The latter may have many rungs on the ladder — technical director,

chief technician(s), head supervisor, supervisors, senior R.T.'s, junior R.T.'s, second-year students, first-year students. There may be similar gradations among the x-ray nurses, among "mechanical" personnel, or among clerical staff.

To the extent to which each subdepartment's work is completely different from the others, the opportunities for friction are somewhat reduced. The x-ray nurses in one hospital present a peculiar problem since they are responsible both to the medical and technical directors of the radiology department and to the nursing department. This presents a potential source of conflict.

Characteristics of the Work Situation

With advances in technique, new equipment, and new procedures, the field of radiography has become increasingly complex. This has necessitated, as already discussed, both specialization and a division of labour along several lines. Basic lines of differentiation in any department are those that separate medical men (radiologist, resident, cardiologist), technical staff (x-ray technicians, darkroom technicians), and clerical staff (secretaries, bookkeepers, receptionists). Within each of these categories we may find further specialization as noted below.

Technical Work

Since our main consideration is paramedical personnel, the first and last of the above-named categories (medical and clerical) will be discussed only briefly. The remainder of the report will focus on the technicians themselves.

The doctors and radiologists in an x-ray department carry out special procedures (assisted by other staff in the department). They read the films, advise other doctors, and so on. In one hospital it was indicated that the radiologists looked after private patients while the residents (specializing in radiography) looked after public patients.

X-ray nurses present an interesting case. As nurses, they may assist in the operating room where some special procedures are done, give drugs, and assist very ill patients throughout the x-ray procedures. Usually, however, there is no real need for the strictly medical services of a large number of nurses. One nurse may be kept very busy (Hospital A), but half a dozen might find time on their hands. Nurses have come to take over areas which formerly were the territory of the technicians — setting up for procedures, extra patient care, assisting the doctors.

This, then, might be considered one of the new paramedical occupations. Not all radiology departments have these nurses as yet, and those that do weight their importance differently. Usually these women have been regular R.N.'s for a number of years already, and were moved over at some point in their career to

"help out". Their work may be strenuous, or not, depending on the particular niche that is carved out. The nurses strongly proclaim the worth of their duties; the technicians often disagree.

Little need be said about clerical staff. They are responsible for the paperwork (regulations, reports, fees), or secretarial work for the radiologists and medical or technical directors, or for making appointments for, and keeping records on, outpatients.

The technician must be versatile, an efficient and careful operator of complex technical equipment; she must be a capable and friendly handler of human beings, many of whom are ill; and she must be able to develop film, judge its quality, and see any flaws. Although in the larger hospitals some of her nursing and developing duties may be taken over by others, she still must be able and prepared to handle all aspects of the job.

A technician's work is a combination of independent effort and teamwork, since she may work in conjunction with a radiologist, R.N., or other technician. Unlike the physiotherapist, however, the technician has no latitude in choice of treatment. A specific x-ray has been ordered by a doctor; that x-ray must be taken. The only real hindrance to successful completion of the task would be the inability of a patient to cooperate. Otherwise, the procedure is usually a standardized routine for positioning the patient and taking the film. The degree of independence of the technician is, therefore, strictly limited. She is very much the *technician,* guided by specific orders from a medical man and trained in a limited number of set procedures. The relationship to the patient is transitory and brief — one of cooperation rather than healing. Her relationship to the doctor is, in a sense, much more direct and important. All her work is judged daily; material records (films) remain behind to pass under the close scrutiny of the doctor who has ordered them. Moreover, the results of the technician's work often form an essential diagnostic tool for that doctor.

Automation has been a factor of importance in radiology since, of course, x-rays depend on machines as well as people. Presently, for example, new developing machines which have films ready in a matter of seconds are coming into use. These machines drastically cut down time and complexity. X-ray machines, though complex themselves, are also becoming simpler to operate, at the same time as their uses multiply. The technicians may eventually find it impossible to understand the internal mechanics of these machines, but they will probably always be necessary for handling the human element. At the moment, they are required to understand enough physics to repair them, though in all cases they reported that job belonged exclusively to the "repairman".

Work Flow

The radiology department handles both inpatients and outpatients. No division is made among technicians as to inpatients and outpatients. Their work originates with a requisition slip signed by the patient's doctor and listing the number and type of x-rays desired. The office staff is responsible for sorting these requisitions, making appointments and informing the technicians of their daily work load. Patients are usually taken to and from their rooms by orderlies or porters. After the x-ray has been taken, the technician records what she has done, attaches the requisition to the film, and delivers both to the darkroom technician. He may return these to the office himself.

There seems to be great potential for confusion, unless someone is available to coordinate patient, room and technician. At Hospital A one girl was assigned to traffic control only, and seemed to manage quite well. While it is true that we were in the hospitals during the holiday months when they were often short-staffed, it appears (from the many patients lined up and waiting, and the technicians hurrying to and fro) that some special sort of traffic control is necessary.

The number of patients x-rayed in a day by a technician varies with the type of work being done. A special procedure may take up to two hours to complete, whereas routine x-rays, such as chests, may be done in a matter of minutes. The majority of technicians remain in the department during their working hours. One or two technicians, however, may be assigned to portables — taking portable x-ray machines on to the wards or into operating rooms when the patient cannot be moved. X-ray departments must naturally be covered at all times. Those departments studied usually had the bulk of their staff on day shifts, since almost all inpatient x-rays can be scheduled beforehand. A skeleton staff is kept at nights and on weekends. The larger hospitals have x-ray units in their emergency departments, whereas others do emergency x-rays wherever space is available in the x-ray department at the time.

Specialization and Division of Labour

The advent of some of the new specializations is a function of the new equipment. Fluoroscopy equipment, for instance, is probably not in all Ontario hospitals yet (especially the smaller ones) and not all technicians are trained to operate it. Some of the special procedures fall into the same category. In hospitals where neurosurgery and cardiovascular work are done, there are usually specific technicians who specialize in these areas of radiology. In some cases, the doctors have requested that certain technicians specialize and become responsible for keeping abreast of all advances and changes.

Specialization among technicians is chiefly a characteristic of the large urban hospital. At Hospital E, by contrast, no special procedures are done at all. There is no neurologist in that small city and the cardiovascular work is done at

another hospital. Here, the chief technician favours a rotation schedule to prevent his technicians from becoming rusty in any one area. Each hospital had a similar rotation schedule for most of its technicians. The fact that the various types of x-rays usually are divided in some manner by "room" (e.g., gastric room, emergency, chest room, special procedures, routine room) facilitates scheduling. In one hospital (A), however, the senior R.T.'s were allowed to choose a "room" on a more or less permanent basis to save the time lost in the relearning process. Only juniors and students rotated in this hospital.

Specialization of a sort may also occur according to sex if there are male technicians. In the "colon room" of Hospital C, for instance, the male technicians perform the male voiding cystograms while the female technicians do the pelvimeters.

Division of labour among the technicians is affected by position in the hierarchy, size of the hospital, and total volume of the work load. In small hospitals, such as Hospital E, all the technicians do routine radiology procedures, including the chief technician, who is also responsible for teaching. On the other hand, the chief technician of Hospital B, a large urban hospital in Toronto, is so burdened by administrative and secretarial work that he hardly has time to supervise his staff, much less participate in the routine work itself.

There may be a division of labour among senior technicians, junior technicians, and students. Every department studied ideally would like to have at least one of each in every "room". This is not always the case in practice. When a student is paired with a senior or junior R.T., the latter usually is expected to serve as a teacher. However, there is often little time for questions and explanations, so that these occasions are often little more than observation sessions for the student.

Supervision and Control

The amount of formal supervision of technicians in the hospitals studied seemed minimal, despite the existence of an established hierarchy of positions. In most cases it seems that there just are not enough personnel with enough time to do a complete job. The technicians are physically separated from each other, in different "rooms", and moreover it is not feasible to "hang over their shoulders" or to check each film immediately after it has been developed. While the students' work is always checked by a graduate, there is often no one to check closely the graduate's work. The R.T. must, then, be a perceptive judge of the quality of her own work.

The professional autonomy of the radiographer (x-ray technician) thus varies with the amount of supervision she receives in the actual carrying out of her tasks. Much depends on the presence or absence of regular checks on the quality of the films (quality control). In some cases, the chief technician has time for this; in other cases, no one else sees the films before the doctors, who might well vary in

their standards and demands. In general, it might be said that radiology falls somewhere between the laboratories and physiotherapy in terms of strictness of control.

Only indirect means are applied in the usual check on the quality of staff members and of the products of their labours. However, the very irregularity of spot checks by supervisory staff may keep technicians on their toes. Moreover, if a doctor or radiologist complains loudly enough, the film may be retaken. Any technician who consistently turned in poor films would eventually be discovered and measures would be taken according to the degree of seriousness of the problem. We did not encounter any such cases.

Staffing the Departments

Qualifications of the Staff

The qualifications of x-ray technicians are generally uniform. The training is relatively standardized and there are few levels of competence. After two years of training a student becomes a junior technician; thereafter, his capability and experience, rather than additional training or examinations, are the prerequisites for promotion to senior technician, and possibly later to chief technician.

Formal Training Programs

Each of the five hospitals has a two-year training program for radiographers (theory and practical on-the-job). These two years seem to be fairly consistent across the province and elsewhere. In Ontario, students are required to have grade 12 or 13 (in Ottawa, grade 11 if educated in Quebec). Almost every respondent sampled had been trained in one of these two provinces. The few trained in other parts of Canada or Europe (especially England) had achieved comparable qualifications.

In Toronto there have been discussions and plans for centralized training schools. Initially each (teaching) hospital had its own training program. A one-year experiment with a central school a few years ago failed to catch on and decentralization was reinstated. A year ago, however, six large hospitals united in a training program involving one year of theoretical work in a central school and one year of practical training in the hospital. This year, Hospital C, together with three other hospitals, has set up a similar program in which twenty-five students are enrolled. Plans are still afoot for the construction of a technical training school in Toronto for laboratory and x-ray technicians. The quality of the various schools in the past has varied considerably (especially on the theoretical side). It is hoped the new school will help to counteract any deficiencies of course content or quality of the teaching staff.

A wide variety of subjects may be taught to student radiographers besides the practical training received on the job. At Hospital A, where both students and staff

praise the course highly, the following are taught: physics, anatomy, psychology, pathology, radiobiology, basic photography, nursing essentials, special procedures, radiographic technique, positioning, apparatus, and darkroom procedures. We heard of no "postgraduate" courses for radiographers.

Since most of the technicians contacted had been trained in Ontario, it is somewhat difficult to make generalizations about those trained abroad. Samples of their diverse backgrounds are as follows:

Female — two years (following grade 12) at University of Dublin, Ireland.
Male — four years (following grade 12) in Hong Kong.
Female — four years (following grade 12) at a technical institute in Australia.
Male — training received with RCAF during World War II.

One difference is evident, however. More men are trained in radiography in Britain than in Canada.

The training of an x-ray technician cannot readily be separated from the work situation. Every hospital provides some sort of theoretical lecture-type training — usually somewhat less than half the total time. But all of this must daily be put into practice in a real work situation, under the guidance and supervision of graduates. It is here that a student indicates his or her capability.

Hospital A. The school is headed by a Directress of Studies who is a nun, a former high school teacher and an x-ray technician. Approximately half of the time spent in the course involves classroom work in a house across the street (used for this purpose), and half involves actual practical work in the department. Students are paid a "salary" of $125 per month. Fifteen students are accepted each year, of whom only two-thirds actually complete the two years. At the time of interviewing, there were seven in the first year and seven who had just completed their second year. The department had plans to hire five of them after they wrote their R.T. examinations in the fall. Students and staff alike thought highly of this training program.

Hospital B. This hospital also offers a two-year training course for high school students possessing a strong mathematics and physics background. At the time of interviewing there were thirteen students in the department, and eight more were to be taken on in the fall. The chief technician was responsible for choosing the applicants and running the teaching program in addition to all his other duties.

Some of the students interviewed had several complaints to make regarding the course: not enough lectures in second year; lack of prior orientation for first-year students before they begin working directly in the department; poor and uninterested lecturers.

At present, however, this hospital is participating in a joint lecture program with three other Toronto hospitals which we were unable to evaluate.

Hospital C. The course offered here also combined lectures and practical training for two years. During the first year there were classes four days a week, with one day left free for general duty in the department. Since the combined program was initiated in the fall of 1967, this pattern has changed somewhat. All the students are taking combined theoretical work for a year at Hospital C, followed by a year of practical training at their sponsoring hospitals.

Hospital D. Beginning in 1966, a formal centralized training program for R.T.'s was begun in this city in northern Ontario. One of the three chief technicians acts as teaching supervisor. At the time of interviewing there was a total of twenty-one students in both years. Each applicant must have an interview with the supervisor. Only twelve students are accepted from applicants which may number as many as seventy. The participating hospitals provide a stipend of $100 per month for their respective students. A standard curriculum, approved by the CMA, is followed here.

Hospital E. The head technician is responsible for the training program here. Four of about thirty-five applicants are taken each year. As part of their training, the senior students are sent to Kingston for one month to learn special procedures. There is usually a surplus of graduates because the staff is fairly stable. Jobs usually are available in smaller hospitals in the area.

Recruitment Practice and Results

Generally speaking, hospitals recruit directly from their own training programs. Thus most of the younger technicians on staff have been trained in the hospital where they are working (see Table 12).

TABLE 12
Technicians by Number of Other Places Worked During Career

Hospital	None	One	Two
A	10		1
B	n/a		
C	12	2	
D	6	1	
E	n/a		
Total	28	3	1

It can probably be safely assumed that those reporting no moves were trained in the hospital where they are presently employed. Therefore it appears that about 87 per cent of the technicians in our sample were home-trained. For those on whom we have data, twenty-one were trained in Ontario, three in Quebec and three outside Canada.

Further light is shed on this by examining the country of birth of the radiology technicians in our sample. Thirty-seven of forty-five, or 82 per cent, were born in Canada. Of the others, three were born in the U.K., two in Germany and one each in Scandinavia, Australia and Asia. Of all the major paramedical groups in our study, radiology was the least dependent on immigrant personnel.

It is noticeable as well that recruitment is largely local, that most personnel have been born and/or raised in or near the area where they choose to work. The majority, by far, were born in Canada, in either Ontario or Quebec. More than half of the radiological staff at Hospital A in Ottawa were of French-Canadian origin, possessing various degrees of bilingualism. It appears that radiology technicians as a whole tend to stick closer to home and be less travel-prone than, for example, physiotherapists.

Less than one-quarter of all radiographers sampled were men, and most of these were in supervisory positions or were darkroom technicians. Of the remaining three-quarters, about two-thirds were single girls. One Sister in an administrative position (Hospital C) felt strongly that the preponderance of female students ("little girls") was dangerous. According to her, they combine high turnover with low motivation, limited ability, extreme youth, and inexperience.

TABLE 13
X-ray Technicians by Sex

Hospital	Male	Female
A	2	9
B	2	6
C	1	13
D	1	5
E	1	3
Total	7	36

Few men are attracted to this type of work because salaries are low, as are ceilings for promotion, and because in Canada x-ray technology (like nursing) has commonly been thought of as "woman's work". Since women are more likely to get married and eventually stop working, the low salaries and limited opportunities of advancement do not necessarily deter them.

Less obvious patterns of recruitment appear with respect to social class. Our only index for measuring social class was father's occupation; hence, any generalizations on this subject are necessarily rough indeed. The responses to this varied widely, from doctor to miner. However, the weight seems to fall towards the "lower" and "middle" classes (as these terms are commonly understood). In northern Ontario it was found that a fairly large proportion were miners. The

technicians themselves apparently had not moved very far above their parents, being hemmed in by limited education, low salaries, and few opportunities for advancement.

If staff are required beyond those available from the graduating R.T.'s, hospitals may advertise in local and national publications or in the Society's journal. In most cases, the problem is not acute. In Hospital E, there is even a surplus of trained graduates.

Retention and Career Development of Workers

As in some of the other paramedical occupations, the fact that most of the technicians are women — and young, single women at that — poses problems for retention of staff. One supervisor felt that x-ray students tended to be the "fall-outs" who have not made it or could not make it elsewhere. Under these circumstances a career orientation is somewhat hard to stimulate.

We discovered no arrangements for advanced or refresher courses for radiological technicians; nor for any on-the-job training to raise qualifications. In only one case was a technician planning to study (on his own) to improve his qualifications and chances for promotion. In general, an x-ray technician has no real opportunity for advancement unless she aspires to the study of medicine in order to became a radiologist. (None of the respondents even dreamed of this avenue of advancement.) Extra study by an individual on her own will probably go unrewarded because vertical mobility is so limited. Chances of promotion from junior to senior R.T. are fairly good if a technician remains in the same hospital for several years. Beyond that level there are other hurdles. Some hospitals place nuns in all supervisory and administrative positions. Others like to have male staff in positions of authority. In keeping with their general lack of career orientation, most technicians in our sample did not seem to object to these rather arbitrary ceilings placed upon them.

In order partially to combat the problems of the high female attrition rate (one estimate was that 80 per cent of the graduates drop out after two years), and lack of career orientation, the chief technician at Hospital B had made it a practice to search out, train, or hire as many men as possible. As a result, 50 per cent of his staff are male. His is a glaring exception to the rule.

Since ceilings are generally low in all hospitals, the impetus behind horizontal mobility (changing hospitals) comes from dissatisfaction with working conditions, chance of a higher salary, the desire for a new husband-hunting ground, or just the desire for a change.

A significant number of the respondents were dissatisfied (in varying degrees) with their present jobs and some (at least six in the sample) would "definitely

not" choose this career again. On the other hand, there were about ten in the sample who were "very satisfied" with their jobs, though only one felt she would choose radiography again "definitely". The remainder were mainly "fairly satisfied" with their work.

Complaints from the technicians varied. Low salaries were invariably mentioned. It is apparent that x-ray technicians as a whole receive rather low salaries. Students earn $3,000; graduates generally between $4,000 and $5,000; senior R.T.'s at Hospital A were earning between $5,000 and $6,000. Any salaries higher than these were those of chief technicians or supervisors, and the highest of these (in the sample) was in the $8,000-$9,000 range (Hospital D).

Other complaints included lack of staff, space or equipment, low ceilings on promotion, or long hours (nine hours per day). On the other hand, some of the "non-complaints" may be mentioned, such as "I'm proud I work at (Hospital C)", or "the staff is just great", or "no complaints about this job".

Role of Occupational Association

This association has no real authority to support any demands its members might have. It can only advise and suggest. Some of its major interests at the moment are the formation of central training schools, standardization of entrance requirements, licensing power, and collective bargaining.

X-ray technicians' comments about the society vary from a rather disinterested "satisfied" to an antagonistic "very dissatisfied". Their chief complaint, common in the paramedical occupations, is salary, and the helplessness of the Society to increase it. The largest proportion of the members are inactive in the sense that they rarely attend meetings. They do have some definite opinions as to what the Society's powers should be, however. Everyone seemed to be amenable to its taking responsibility for training; almost all were against radiology becoming more like the older, established professions; all but one or two opposed unionizing; all but one or two advocated collective bargaining; and a substantial number (ten) advocated striking. This support of strike action stands out in sharp contrast to the opinions of the vast majority of medical personnel who generally find collective bargaining and unions repugnant. The fact that x-ray technicians themselves do not directly participate in the "sacred" healing process may partially account for this.

Chapter 7 Electroencephalograph Technicians

Numbers and Importance

Electroencephalograph (E.E.G.) technicians, like those in radiology, must possess competence in technical matters and in handling patients. E.E.G. technicians, however, have yet to obtain the same degree of professional acceptance within hospitals. The OHSC has been somewhat slow to recognize the importance of, and to provide the financial support for, registered electroencephalograph technicians (R.E.T's). Consequently, hospitals may employ unregistered technicians (for lower salaries). The Canadian Society of E.E.G. Technicians is weakened by its lack of funds and small membership. As yet, it has been unable to press effectively for professional status, specific training requirements, and common certification procedures.

The field is apparently not characterized by the rapid growth and diffusion so evident in several of the other paramedical occupations. It is marked rather by gradual changes and adjustments within each department — changes in location of the department, the addition of a technician or newer equipment. The pace and enthusiasm for innovation, training programs and expansion varies across hospital departments; much depends on the characteristics of the personnel themselves.

The fact that some aspects of the work overlap with the domain of other hospital personnel has led to some adjustments. Since nurses are trained and legally permitted to give medications and administer needle or nasal electrodes, some hospitals prefer to train nurses to do the work rather than hire technicians. In one case (Hospital A) the echo-E.E.G. machine was transferred to the radiology department.

Organization of the Departments

Size and Composition of Staff

Hospital A — 600 beds
head technician (R.E.T.)
senior technician (R.E.T.)
2 assistant technicians

Hospital B — 800 beds
senior technician (R.N.)
assistant technician (R.N.)

Hospital C — 900 beds
senior technician (R.E.T.)
technician

Hospital D — 300 beds
head technician (R.N.)
assistant technician

Hospital E — 200 beds
no facilities —
cases sent elsewhere

Levels of Authority

There are no more than two levels of authority within the department itself. Usually one of the technicians is designated the senior according to qualifications and/or number of years experience. Since the number of staff is quite limited, each person does the same technical work of taking E.E.G.'s. The senior person has additional responsibilities for staff and training, and for admitting patients to the department; he or she is the person directly responsible to the medical personnel concerned.

There may or may not be a medical director responsible for this unit alone. Usually the E.E.G. units fall under the jurisdiction of the neurology department, and the neurologist thus has ultimate responsibility for reading the reports. Hospital D presents an interesting case, probably not at all uncommon among outlying smaller hospitals. It does not have a neurologist but shares the services of one from the Hospital for Sick Children in Toronto. All the recordings are sent to him for interpretation and, apart from occasional visits to the hospital, he runs the operation by remote control. This makes the chief technician responsible not only to the doctor (for medical-legal problems) but also to the Sister Superior (for administrative purposes). In general, because the neurologists have several other important commitments to absorb their time, the chief technician carries most of the authority during a regular working day.

Characteristics of Work Situation

Technical Work

An E.E.G. department is basically concerned with routine E.E.G. examinations done in the department. These may be prescribed for a number of things; all accident cases and people with headaches and mental disorders usually receive them as a general diagnostic procedure. Epilepsy cases and chronic convulsives are examined by E.E.G., as are some types of psychiatric disorders. Other less routine tests may be conducted from time to time, and occasionally E.E.G. equipment will be used in the operating room during the course of brain surgery.

A routine E.E.G. seems to vary somewhat from hospital to hospital. When the patient arrives at the department, he must be prepared ("prepped") and calmed down before the recording can be successfully taken. Preparation involves applying electrodes to places on the head which must be free of both hair and oil. Every effort is made to soothe and relax the patient, for the objective is to obtain at least twenty minutes of perfect, motionless recording time. Of course, considerable skill in dealing with frightened and ill patients is required. Babies, young children and some psychiatric cases may require even greater amounts of patience and goodwill. The technicians at Hospital A pride themselves on their "rocking chair" abilities; the chief technician at Hospital B uses her training in psychiatric nursing to advantage. Nevertheless, E.E.G.'s may take hours to complete on restless patients. In some cases, medications are given to calm a patient. If the technician is a nurse, she may do this herself. Ordinary technicians normally do not do so.

The recording itself, after a test run, consists of a number of runs (six at Hospital A, twelve at Hospital B) using the machine and different combinations of electrodes and activities of the patient. The tracings are marked by the technician running the test to indicate the different phases. Two variations on this procedure are the "sleep" test and the "metrazol" test, both of which involve the use of drugs. In the former, the patient is put to sleep by a drug administered by a doctor or nurse; in the latter, the drug metrazol is used to simulate a convulsion.

Besides preparing for and conducting the tests, there are several additional tasks which must be done: ordering, maintenance, teaching, reports, filing.

Work Flow

E.E.G. departments operate by requisition from the patient's doctor. The chief technician will set priorities regarding the urgency of certain cases, and appointments will be made. The patients may be brought to the department, or the technician may have to fetch the patient herself. Appointments may be quite irregular from day to day; emergencies cannot be predicted. Thus, the daily work is seldom formally scheduled for each staff member.

After the recording is taken, it is given the finishing touches and sent on to be read. At Hospital C there are two doctors available to read the tracings every night. At Hospital A, on the other hand, the tracings must be sent downtown to a neurologist who has a practice of his own as well as being consultant to other area hospitals. Apparently it takes five to seven days from the time the recording is made until the busy doctor gets around to reading it. Hospital D has to send its recordings several hundred miles to be interpreted. Routine cases are returned in about seven days. Urgent cases are sent by special delivery mail, and the report is phoned back the next day. In each case, interpretations go back directly to the department rather than to the referring doctor.

The number of cases done in each department varies with the number of machines, working conditions, number of staff, size of the hospital, and so on. Hospitals A and C each have two machines; the others have one. Eight patients seem to be the maximum load for one machine per day. Hospital B averages four or five; Hospital D, about three or four. Hospitals A and C ought to do more cases, since there are two machines. It appeared, however, that Hospital A, which also had additional staff, was handling only about as many cases as hospitals with only one machine. The noise and distraction level of their work area might partially account for this, as well as a lower number of referrals in the first place.

Most of the examinations are done on neurology patients (85 to 90 per cent) and on inpatients. Perhaps a third of all patients given E.E.G.'s are outpatients.

Some hospitals service others as well. Hospital A services at least six other hospitals in the area; Hospital D has the only E.E.G. facilities for the area from North Bay to Sault Ste. Marie, and services between fifty and 100 doctors from this area.

Technicians normally work an eight-hour day with no overtime, but may be called in for emergency cases.

Specialization and Division of Labour

An E.E.G. technician is considerably specialized to begin with. With training only in E.E.G. work, it is doubtful if a technician could reapply his skills to any other job without retraining. He is theoretically capable of doing technical work only — that is, of operating the machine and detecting any abnormalities. He is not required, and usually is unable, to diagnose or prescribe treatment.

Within the department itself, as has been indicated, the work load generally is shared equally. If one of the technicians is also a nurse, she will give injections and medication. At Hospital A, however, the technicians do this if medical personnel are not available; they also use "needle" electrodes with their portable equipment, a procedure requiring "sterile technique" that only doctors or nurses are supposed to do.

Supervision and Control

Supervision from outside the actual unit comes from the doctors or neurologist in charge of interpreting the recordings. They usually are not concerned with the daily technical work, but their reading of the recordings is, in effect, a control over this. The degree to which assistants or students are supervised by their superiors depends on the number of staff and the amount of time available. Supervision is mainly of an indirect sort.

The department itself is autonomous within the hospital, although it depends on two units especially (psychiatry and neurology) for its work.

Staffing the Departments

Qualifications of the Staff

Ideally, each technician should have the minimum high school requirements (Ontario grade 12 or Quebec grade 11), two years' experience on the job and a passing grade in the R.E.T. examinations set by the Society. This, however, is not yet universally demanded and qualifications accepted by these hospitals vary.

At Hospital A, two of the technicians have the R.E.T. One of these had four years of secondary school and six months' on-the-job intensive training at Montreal Neurological Institute. The other had three years of high school and eleven years of experience. The two assistants have the required Ontario grade 12, or Quebec grade 11, plus the necessary two years' experience, but have yet to write their examinations.

At Hospital B, both technicians are nurses, the senior a former psychiatric nurse.

At Hospital C, the senior technician obtained the equivalent of Ontario grade 13 in Hungary and got her R.E.T. in Canada.

At Hospital D, both the head technician and her assistant have had nurse's training, although only the former earned her R.N. Both also had work experience in the field for a considerable number of years. Neither is registered because she must work under an R.E.T. for two years before she can try her examinations. Although both would like to write the examinations, there is no R.E.T. available.

Training

There is little in the way of formal or structured training programs for E.E.G. technicians. Examinations may be taken after two years of on-the-job experience working under an already registered technician. In a large proportion of cases, technicians do not get around to writing these examinations, however. A number of factors may be relevant here. Hospitals need staff so badly they cannot be overly particular about the fine details of training and examinations. Also, non-registered technicians need not be paid as much as registered ones. Training is available only within the work situation (in Canada) and thus may vary in quantity and quality according to the conscientiousness and abilities of the teachers (doctors and technicians) and the time available. At Hospital A, for example, the senior technicians have found it difficult to teach subjects like anatomy and physiology.

Since the requirements are not demanding, the recruitment of younger people is quite simple, but the erratic and uncentralized training programs have sometimes contributed to rapid turnover of initiates. The girls become disillusioned with the lack of a formal program and the absence of a specific timetable for com-

pletion, advancement, and so on. They find themselves rapidly enmeshed in dull, routine work and consequently become bored. There is little opportunity for variety and challenge, since anything irregular is handled by more qualified personnel. This seemed to be a specific problem at Hospital A, which had a somewhat larger staff than the others. The staff at the other hospitals tended to be quite stable.

There appear to be no opportunities for postgraduate courses for E.E.G. technicians.

Recruitment

There seems to be no common pattern with respect to hospital recruitment of staff. Some come with merely a high school education, others with an R.N. and a considerable number of years of experience. They are often attracted by more favourable working hours.

All but two of the technicians in this sample were female. This may reflect again the general pattern among paramedicals: the "woman's work" image, and limitations on salary and advancement. One chief technician, however, seemed to think that the sexes were about evenly divided overall, since many men were trained for this kind of job during the war.

We did not encounter any older, single women in our limited sample. The older technicians tended to be married.

Job Satisfaction

All the respondents interviewed were quite satisfied with their jobs and pleased with their choice of occupation. Salaries varied, but no one complained vociferously about them. They ranged from $3,000-$4,000 for a technician without nursing experience or an R.E.T., to $5,000-$6,000 for a chief technician. Since spouses often worked, this income was largely supplemental.

There were no repeated complaints about the limited opportunities for advancement, but some did feel there was a need for a centralized, formal course to supplement training at work.

Role of Occupational Association

Registered technicians belong to the Canadian Society of E.E.G. Technicians. Others may become associate members after two years' working experience. This is the only E.E.G. association in Canada; it was founded only a few years ago. As yet, it has exerted little influence but E.E.G. technicians have not begun to complain about its lack of action. Those in the sample opposed striking, unions, and sometimes collective bargaining as well.

Chapter 8 Electrocardiography Technicians

Numbers and Importance

The work of an electrocardiography (E.C.G.) technician involves only a few basic procedures and the simple operation of a machine. There are, therefore, no formal courses for this work and only indifferent requirements. Some changes do occur in this area, but they result mainly from advances in other fields and from innovations introduced by the doctors. There is no professional association for these staff.

E.C.G. technicians, since they are few in number and since their work is related to several medical fields, do not necessarily operate within a separate department. The arrangements are subject to a degree of variation from hospital to hospital.

Organization of the Departments

Size and Composition of Staff

Hospital A — 600 beds
director of electrocardiography (M.D.)
cardiologist
resident in cardiology
secretary
head technician
3 E.C.G. technicians
departmental aide

Hospital B — 800 beds
chief cardiologist
other cardiologists
head technician
3 E.C.G. technicians

Hospital C — 900 beds
5 doctors read cardiograms
supervisor
3 E.C.G. technicians
secretary

Hospital D — 300 beds
1 technician
1 student

Hospital E — 200 beds

E.C.G.'s are done by a laboratory technician and read by an interne

Levels of Authority

There are two general levels of authority — the medical and the technical. In all cases, the E.C.G. technicians are responsible to some extent to medical men, usually cardiologists. Doctors do the interpretation of cardiograms and are thus in regular contact with the technicians.

Among the technicians themselves there are also two levels, since a distinction is usually made between the head technician and the others. The latter are directly responsible to their head, who in turn is responsible to the medical man in charge of electrocardiography.

Characteristics of Work Situation

Technical Work

E.C.G. technicians work with a compact machine, often portable, which takes and records the activity of the heart. Since most of their patients are quite ill, this usually is done on the wards. At Hospitals A and C, patients could also be brought down to the department. In contrast to taking electroencephalograms, the average time needed to take an E.C.G. is short — four to ten minutes per patient. This means that a large number of cases can be handled in a day. At Hospital C, for example, sixty to eighty patients were taken daily, and occasionally up to 1,000 per week. In Hospital A, however, only about ten are done on the average day.

A technician's work is almost evenly divided between taking E.C.G.'s, and doing reports and processing. The tracings are cut and mounted on a card for each patient, and reports are typed. This paperwork usually is done in the afternoon, with each technician doing a little of everything.

Work Flow

The work is initiated by requisitions from doctors. These may be received the day before, as at Hospital A. After the requisitions have been allotted, the technicians either take the portable machines to the wards or telephone for the patient to be brought to the department. After the recordings are processed, they are read by the doctor; the technician has no further duties.

E.C.G. technicians usually work a regular eight-hour day with no overtime. Weekends are usually covered by the doctors themselves, although the technicians at Hospital C work Saturday morning.

Specialization and Division of Labour

As noted above the technicians take the cardiograms, the physicians read and act on them. The head technician has certain administrative duties, such as paperwork,

making appointments, supervising of staff, and acting as liaison with the doctors. This may be in addition to some technical work. Otherwise, there is little specialization in this unit at the moment and scant promise for any in the future.

Supervision and Control

Work is supervised to the extent that doctors read the E.C.G.'s and write reports on them. They are thus in a position to review daily the work of the technicians and to catch any errors. If there are any, the head technician is informed and presumably the recording is repeated. The probability of errors is very low, however.

Staffing the Departments

Qualifications of the Staff

Qualifications vary but usually hospitals require at least some high school education, preferably grade 12 in Ontario, or more.

Training

There are no formal training programs. The work procedures require a minimum of medical background and can be learned on the job in no more than two months of observation and practice. No advanced courses exist which specifically pertain to this work.

Recruitment

It seems to be fairly common to find that E.C.G. technicians are "retired" nurses who have moved over to an easier job — both mentally and physically — with more reasonable hours. This seemed to be the pattern at Hospital B, for example. Nurses may, therefore, be recruited from within the hospital. Otherwise, advertisements may be placed in the papers, or news of an opening may pass through the grapevine. No one mentioned problems of high attrition or replacement of staff.

Recruitment is usually local, since the job offers little in the way of glamour or tempting salary to attract anyone from far away. All of the technicians interviewed were Canadian.

There is a notable pattern of recruitment by sex as well — all interviewed were female. The technicians themselves consider it "woman's work" since it offers a low salary, little challenge or opportunity for advancement, and since women "don't like men fiddling around their chests".

Not only then is this "woman's work", but it seems to attract only certain categories of women: older, single women looking for a relatively comfortable position in order to support themselves, and young single women with limited education and career ambition, marking time until marriage.

Job Satisfaction

Each of the few technicians interviewed expressed some degree of satisfaction with her job and felt her choice was a fairly good one for herself. No one expressed dissatisfaction with hours, or lack of opportunities for advancement. Working conditions, if cramped (as at Hospital B) or especially dreary (as at Hospital A), were cause for some complaint. However, by far the major complaint is low salary. Most E.C.G. technicians make between $3,000 and $4,000 per year. The head technician at Hospital A makes between $5,000 and $6,000. Several technicians expressed interest in a special course for E.C.G., including additional medical training and patient care.

These technicians would like to see their work upgraded in both salary and status. With no association acting on their behalf, this is unlikely.

Chapter 9 Medical Record Librarians

Numbers and Importance

The purpose of the department is threefold: to maintain a running account of each patient; to keep the attending physician up to date; and to provide material for research being done by any of the doctors.

There is little in the way of scientific change or automation occurring in this field of work. Perhaps the greatest change has come with the introduction of a new coding system. On the whole, the operations of the department involve simple paperwork. The only machines used are typewriters and the microfilm machine.

The tasks in the area of medical records require a combination of professional and lay competence. The worker must know medical terminology and operations in order to perform an essentially administrative task, that of filing and coding information on patients. While the work is not highly technical, as one would consider radiography to be, it is not largely "social" as is occupational therapy. It appears to be a hybrid area that combines both features.

The department is rather isolated from the general flow of communication with other departments. The real connection with other areas comes through written forms or the occasional telephone call. There is some teamwork involved, insofar as it is necessary to get the charts from medical records to the admitting, discharging and emergency departments and back again. On the other hand, there is very little contact with patients.

Although this department has the usual complaint regarding insufficient staff, in relation to many of the other areas it seems adequately supplied. Their problem is more often one of physical space than of personnel. Frequently, during expansion of the hospitals, this department is relegated to the smaller rooms and basement regions of the hospital. Hospital B was the most obvious example of this situation. Here the department was spread out over the entire hospital, from the basement where the files were kept to the sixth floor where the steno pool was located. Hospital C had the most spacious and pleasant environment, although they, too, admitted to having suffered very cramped quarters for several years.

As the hospital grows, the problem becomes manifold; for not only is the department shoved into inconvenient corners, but the volume of work increases proportionately with the growth in patient and staff census.

Operation of the Medical Record Library

Size of the Staff

Hospital A. The medical records department here was fairly large; counting the chief librarian and her assistant, there were six registered record librarians and seven students. On the clerical side, there was a private secretary to the head of the department, three clerks doing the filing and microfilming, and three or four clerks assembling, researching and floating.

A definite distinction was made here between the "medical record librarians" and "employees" (clerks). Despite the arbitrariness of the division, however, it appeared that work was shared informally to the extent that the R.R.L.'s did some of the filing. It was not a totally reciprocal arrangement, though; for the "employees" never did coding or correspondence.

Hospital B. The chief librarian here had five R.R.L.'s under her. The clerks were divided into two subgroups: three girls who "checked" the chart for information — "checkers"; and six filing clerks. There were between four and six girls in the steno pool, and a receptionist clerk who looked after statistics and the M.R.L. reports.

Hospital C. The head of the department (a nun) had five R.R.L.'s, each with her own set job. There was a rotation of tasks here. The steno pool had one supervisor and five typists. The clerks were divided into three areas with no rotation of tasks: two admission and discharge clerks; two filing clerks; and one on microfilming.

Unique to the hospital was a Tumor Registry that was attached to the M.R.L. department. This was supervised by a qualified R.N. with two young girls under her. The department was responsible for charting the progress of cancer patients treated at Hospital C.

Hospital D. Hospital D was our example of a northern general hospital. Here, as in other Roman Catholic hospitals, the nun in charge was concerned with administrative tasks. Under her there was one medical record librarian with two medical record technicians on the next level of competence. On the clerical side there were four dictaphone operators and four general clerks.

Hospital E. This hospital, being small in comparison to others studied, had a comparably small department. There was one registered record librarian, one stenographer who took the transcription for dictation, one clerk who looked after filing and admissions, and one long-term girl who acted as assistant librarian and really performed the job of a registered technician.

Composition of the Staff

Medical Record Librarians
- chief or supervisor
- assistant librarians
- students

Clerks
- filing clerks
- checkers
- receptionist (at Hospital B)
- admission and discharge clerks (at Hospital C)
- microfilm clerk

Stenographers Pool
- dictaphone operators
- typists

Levels of Authority

As can be seen from the division of tasks, the levels of authority follow a fairly simple and rigid hierarchy. For the most part, the communications channels with outside people and departments followed the same pattern. Informally it was noted that the filing clerks and steno pool girls did have contact with the doctors in an official capacity. In one hospital the girl in charge of the steno pool often telephoned doctors who were tardy with their reports and even threatened reprisals if they were not submitted immediately. Although she had no authority to effect these threats, the doctors were sufficiently ignorant of the departmental organization that they complied with her demands.

The hierarchy at Hospital C appeared to be more highly developed than at Hospital B. At the latter, the chief librarian is in charge of the entire department, while at the former, one of the nuns is in command. This is a common situation in many of the departments in the Catholic hospitals; lay workers seldom gain the top administrative posts in the units. These are the acknowledged domain of the Sisters. This occurs even in the cases where there might be a more qualified lay person in the department. Such a highly regulated system means that promotion patterns and aspirations are affected. The highest a worker can hope to climb is to the level of assistant. At Hospital B the promotion patterns seemed to be "natural" to a large organization: the librarians can move right up the scale to chief.

Specialization and Division of Labour

The work in the department is divided into various specialties. There are usually three levels in the division of labour. The first and highest consists of the medical record librarians who do the coding of the charts. This involves assigning a specific number to each illness which is then sent to the Hospital Medical Records

Institute, which cross-files these into a general index of all operations and diseases occurring in participating hospitals. The librarians also send out warning notices to the doctors about late reports and, as well, attend to both medical correspondence and legal matters. The former consists of replying to doctors' letters and inquiries; the latter involves going to court with files in lawsuits and insurance claims.

The second level is comprised of filing and checking clerks who are responsible for checking the charts for various departmental records and filing these according to a special numbering system. Frequently, one of these girls is placed in charge of all the microfilmed files.

The third division of labour is the stenographers. The "steno pool", as it is commonly called, transcribes the doctors' reports from dictating machines.

There are major variations in the work systems in the different hospitals. In Hospital C, for example, there is no rotation system such as there is at Hospital B. The value of the rotation system appears to be twofold: the worker becomes competent in all aspects of the work, and the periodic change alleviates boredom.

Technical Work

The technical work of the M.R.L. is limited. The main work involves filming and coding of reports. In order to perform the latter, the librarian must have an adequate knowledge of the whole gamut of medicine, from diagnosis to operations to prognosis. At Hospital E the librarian must police the doctors by checking the charts to see that the diagnosis conforms to laboratory results and that the treatment procedures followed are the proper ones in terms of the diagnosis. Although it would seem that intensive training would be needed, apparently the librarians have to prepare for only a limited number of the more common surgical operations.

There is little difference among the hospitals as far as technical work is concerned. The major variation is volume. The large, urban hospitals obviously handle considerably more files daily than do the smaller ones. Hospital C, for instance, has seventy to eighty discharges a day and up to 140 on weekends.

Some hospitals do more research as well. This is most common in the teaching hospitals. The librarians at Hospitals B and C mentioned large studies being conducted throughout the year. In contrast, little consultation is done on the charts in Hospital E. Occasionally, students from the school of nursing use them for case studies.

The work in the department involves doing qualitative and quantitative analysis of every chart. The librarians code for three separate indexes: the

diagnosis index; the operations index; and the physicians index. Together, these make up the ICDA[1] index. Monthly statistics are also compiled for the Ontario Hospital Services Commission.

Part of the librarian's job also involves invoking enforcement procedures against the doctors when they are tardy in completing their charts. There are variations among the hospitals in the actual withdrawing of privileges, although it is unusual for this to be done in any of them.

At Hospital A a letter is sent after fifteen days to the doctor. If no results come in two weeks, a second letter is sent from the Medical Records Committee. As a final resort a third letter is sent to the head of the delinquent doctor's department from the head of the Committee.

Supervision and Control

The delegation of authority in all departments appeared to be similar. The supervisor appoints assistants and grants responsibilities and authority to them. Formal supervision in all units seemed to be minimal: each worker for the most part is left on her own, unless she encounters some difficulty or falls behind in her work. In the event of the latter, other members offer assistance. The librarians' coding is checked by the Institute when their files are sent in for final processing.

None of the medical record departments visited had quality control programs per se, although, in most cases, the charts of the students were fairly carefully examined. In Hospital A a Chart Committee, composed of doctors and registered record librarians, reviews twenty-five charts from each service for inadequacies. The HMRI returns all reports in which errors are found.

Role of Occupational Association

The registered record librarians were almost unanimous in their opinions of how the Canadian Association of Medical Record Librarians should operate. Everyone approved the idea of collective bargaining and the suggestion that the association be responsible for the training and regulation of its members. Almost everyone strongly disapproved of striking, except one nun who strongly approved. Most did not want the association to be either like a labour union or like the old, established professional associations. Some expressed the feeling that it was a profession already. The latter comment was quite common among the paramedical workers as a whole.

However, for most workers the association did not play a particularly significant role in their careers. There were two reasons for this. Like many of the other paramedical workers, the M.R.L.'s did not feel that their association was a

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[1]International classification adapted for indexing of hospital records and operation classification.

particularly dynamic one. Although most of the professional groups make recommendations to hospitals on minimum salaries for their workers, the hospitals only infrequently adhere to these. The second reason is that in these associations a few hard core, active members dominate the meetings, while the rank and file become increasingly apathetic and inattentive. This seems to be the inevitable fate of all such groups.

Staffing the Departments

Qualifications of Staff and Formal Training Programs

In order to enter the M.R.L. course, it is necessary to have completed grade 13 and have some typing skill. The course is one year (twelve months) and consists of eight main subjects: filing; coding; committee work; medical library work; outpatient processing; clinical photography; microfilming; and statistics. At Hospital A the theory (anatomy, physiology, microbiology and medical terminology) is taught in both French and English, while the practical work is taught in English only. Here three hours a day are spent in classwork, and three on practical work. The registration examination set by the CAMRL is written in August and passing it entitles the students to the R.R.L. Most of the girls are guaranteed a job upon graduation. There is some sentiment for upgrading the course of training. The Sister in charge of the Hospital A training course recommended the establishment of regional schools. Many members of the occupation feel that the course should be extended to two years.

There are eleven schools in Canada — three in Ontario (one each in Ottawa, Toronto and Kingston) and two in Quebec. Because the schools are directly associated with hospitals, the teachers are working librarians in the department. At Hospital A we heard remarks that the teaching librarians deserve increases in salary. At Hospital C the teachers are paid more than the other librarians. However, they also have more responsible positions in the department as well.

The training of the clerks and typists is strictly on-the-job. Although much of their work does involve an understanding and knowledge of medical terms, there is no formal course set up for this. Usually a few weeks of close supervision and some coaching from a manual is the extent of their training.

Recruitment Practice and Results

For the most part, graduates of the schools take employment in either their own hospital of study or in other hospitals. Since the librarian must undergo the CAMRL examinations in order to be registered, the schools are the only source of supply.

The clerical workers and typists are hired on a much less selective basis. Since no training is required for the job, the girls usually are hired either directly from high school or from other clerical jobs.

Considering the clerical nature of the work, it is not surprising that men are seldom attracted to it as a career. The lack of high pay and challenge also deter most males. The obvious consequence of this is that the source of supply is entirely female.

As for age group, the M.R.L. departments seem to attract more older married women than do other paramedical departments.

Recruitment often is done informally. People may apply to one hospital because they know someone there or have heard favourable reports from other workers. Heads of departments will often take a valuable secretary or assistant with them when they move to a new job.

Retention and Career Development of Workers

Informal Training

As mentioned previously, the auxiliary workers in the department are trained informally on the job. This includes learning the work system as well as learning medical terminology and knowing what must be entered on all the work sheets. The work of the checkers is re-examined by the librarians who go over the sheets during coding.

A certain amount of informal training is necessary in any job where the new employee must learn a different system. This occurs for the librarians, as well, in the departments where the rotation system is used. Rotation allows each R.R.L. to gain practical experience and a general competence in all areas.

For the most part, this occupation is a dead end. Not many people use it as a way-station to other higher jobs (as in the case, for example, of foreign doctors working in the laboratories until they write their examinations). Occasionally some nurses come into this field (as in the Tumor Registry at Hospital C).

Refresher and Advanced Courses

Although they were not popular, refresher and advanced courses were offered to the librarians. As library methods do not change rapidly, courses are not really necessary. Also, advances in medical knowledge are learned on the job or through other workers in various ways — i.e., through the doctors, who inform librarians; through the HMRI, which notifies the departments of any major changes; through the librarians who teach at the schools affiliated with the hospitals; or through new graduates coming into the department with fresh ideas. Another possibility is the professional journal. However, it seems that librarians do not read the entire journal but only those articles recommended to them by doctors or by the head of the department.

Attrition and Turnover

The attrition rate is comparatively low in this group. There are two reasons for this. One is the relatively old age group found in most departments. Most of these women are either married or fairly settled older people. Consequently there is not the migration from hospital to hospital for marriage prospects or higher wages. (The latter were considered reasonably good.) It was noticed also that many of the workers had been on their jobs for some years. There seems to be a rather indefinite but nonetheless obvious pattern among such workers; the turnover rate is highest within the first two years. After that, there seems to be a tendency to remain on the job for several years.

In spite of the restricted character of the work the career orientation of M.R.L.'s seems to be fairly high. There were considerably more older women in this department than in most of the others. These included the clerks as well as the librarians. The most career-minded were of two types — the older spinsters and the nuns. Both tended to substitute their careers for a family, to the advantage of the job.

Opportunities for Advancement

There are two promotional steps available to M.R.L.'s: they can move up to second assistant and supervisor and then chief librarian in the department, or in hospitals where there is an affiliated school, they can teach. In Catholic hospitals, since nuns occupy the positions of head of department, lay librarians can move up only to supervisor.

The stenos and clerks officially can advance only to supervisor of their section. Informally, some of these girls after some years of experience assume fairly responsible duties. As noted above, the head steno sometimes threatens tardy doctors with withdrawal of privileges.

Job Satisfaction

The low attrition rate in this occupation would indicate that the workers are fairly satisfied with their job as a career, and with the particular job. As mentioned previously, most of the personnel in the medical records departments had been there over five years on the average.

Chapter 10 Rehabilitation Medicine

Rehabilitation Medicine: What Is it?

The field of rehabilitation medicine is relatively new. Rehabilitation workers include occupational therapists, physiotherapists, speech therapists and rehabilitation nurses. Gradually these practitioners have tried to establish themselves as "professionals" — i.e., as legitimate participants in healing. There still remains a good deal of misunderstanding or ignorance of their role on the part of laymen and medical men alike. One primary distinction must, therefore, be made initially — the personnel in our sample were employed by *general* hospitals and thus the specific kinds of work they did were "specialized" in a sense. Therapists employed by other institutions, such as rehabilitation centres, work with more healthy people; their treatments and purposes may be quite different. This discussion focuses on the former, the hospital-based personnel.

We discovered four different kinds of these hospital-based personnel: physiotherapists, occupational therapists, speech therapists, and rehabilitation nurses. Since the last two types were found in but one hospital and in very limited numbers, this report will deal with them only briefly.

In the last twenty years or so, occupational therapy and physiotherapy departments have doubled (or more) in size as new uses for the therapists' skills have been discovered, promoted, and accepted. As the public has gradually been made aware of the value of such treatment, the number of outpatients treated has increased steadily. Although the physiotherapist once did mostly orthopaedic work, she is now a member of the "team" in every ward and sometimes in the operating room. However, the battle for recognition and respect continues to be fought. Some of the older doctors still find no use for rehabilitation therapists, and some patients strongly resist any efforts to get them to help themselves.

What are the therapist's tasks? One of the reasons it is difficult to formulate a complete, concise job description may be the very nature of therapy itself. Each patient is an individual with an individual disability, requiring individual treatment. The therapist treats a physical problem in a physical sense, rather than surgically or chemically. The various techniques used by a physiotherapist — for example, exercises, hydrotherapy, electrotherapy — are simply different ways of treating the injury. Basically the therapist deals with movement, with the exercise, patterning and restoration of function of the muscles and limbs of patients who are on the mend after an accident or operation.

The physiotherapist in a hospital setting must be equipped and prepared to do any number of treatments. One important type of treatment is exercise in the gym, planned for a specific purpose and carefully supervised by the therapists. Hydrotherapy is another. Here the patient performs special exercises or movements, or is massaged in pools, baths or whirlpools, where he can move more freely and less painfully. Since heat relaxes the muscles, these pools or baths are heated. Electrotherapy may be used for nerve tests, the stimulation of muscles, the creation of vibration (ultrasound treatment), the creation of intense, "deep" heat (shortwave treatment), or "superficial", body-surface heat (infra-red treatment). Another increasingly important part of the hospital physiotherapist's work is the treatment of chests before and after surgery. The coughing and breathing exercises which constitute the "chest routine" clear the lungs and help prevent the onset of further ills such as pneumonia. The latest addition to the field is "P. and F." — proprioceptive neuromuscular facilitation. This treatment is so new that only expensive special courses taught in the United States are as yet available, and most physiotherapists, therefore, are unable to do it. The technique is so complicated, as well as so new, that a simple explanation has yet to be heard. Basically it is a technique by which brain-damaged persons may be helped to relearn simple responses; for example, the "hand-to-mouth" pattern which is "natural" for healthy human beings.

The function of the occupational therapist is even more difficult to define, especially in a hospital setting. One hospital (B) had O.T.'s working in the rehabilitation department, but in three of the four larger hospitals (A, C and D), occupational therapists worked in the psychiatry unit and had little or nothing to do with the rehabilitation department. Briefly, the regular occupational therapists in a hospital setting are concerned with some of the same problems as physiotherapists. Their main aim is restoration of function. They attempt either to teach a patient how to accept his disability or to take him by stages to the point where he can carry out the tasks he did before his injury or operation. By doing something functional, the patient's attention is diverted while the therapist is achieving the strengthening and conditioning desired. Since hospital facilities are limited, crafts of some sort or "the activities of daily living" are the functional activities frequently used.

The occupational therapist seems to have been more widely accepted in the psychiatric wards of general hospitals. Here the requirements of treatment are very flexible. Essentially, a close watch is kept on the patient's behaviour patterns. If the illness has been diagnosed already, the occupational therapist may have the patient perform tasks he is capable of doing. If the illness has not yet been diagnosed, the occupational therapist can help elicit a diagnosis by her observation of the patient's behaviour — his choice of crafts or colours and so on. The therapist may thus aid in confirmation of diagnosis, or in the process of diagnosis

itself. Her work also can be therapeutic in the sense that the patient is encouraged to socialize with at least one other person (and perhaps with a group), and is given a socially acceptable means of expression.

Ideally, this is the role of the "psychiatric" therapist. In one hospital (B) she formed part of a team consisting of a psychiatrist, resident, internes and nurses. However, in a much smaller hospital (D), where staff and time were restricted, the head therapist reported that her work with crafts and group activities was aimed more at diverting (amusing) patients, than giving them special treatments.

We encountered only two speech therapists — both in Hospital B, a large urban hospital. These women saw patients on an appointment basis in their offices and treated only adult, organic cases.

Rehabilitation nursing is the newest paramedical occupation in the field of rehabilitation, and, as far as we know, exists only at Hospital B. It is an occupation newly emerging from several others. There are few actual nursing skills or therapeutic techniques directly involved. Instead, the work tends to lean towards social work — i.e., the education of the patient in self-care before and after going home from the hospital, preparation of the patient's family, and so on. Rehabilitation nurses usually spend most of their time on the wards, going *to* the patients.

Organization of the Departments

Size and Composition of Staff

Hospital A — 600 beds
chief therapist (physiotherapist)
deputy therapist (charge physiotherapist)
6 staff physiotherapists
students
1 speech therapist — psychiatric
2 occupational therapists — psychiatric

Hospital B — 800 beds
chief physiatrist (doctor)
4 doctors
supervisor of physiotherapy
supervisor of occupational therapy
chief speech therapist
chief rehabilitation nurse
19 physiotherapists
students
3 occupational therapists — general
2 occupational therapists — psychiatric

1 speech therapist
3 rehabilitation nurses
2 ward aides
1 porter
4 secretaries

Hospital C — 900 beds
medical director
department head — administrative (nun)
head physiotherapist
assistant head physiotherapist
11 staff physiotherapists
students
1 orderly
2 secretaries
1 occupational therapist — psychiatric
1 speech therapist

Hospital D — 300 beds
chief physiotherapist
1 assistant physiotherapist (not a graduate)
4 students (summer only)
2 occupational therapists — psychiatric
1 craft worker plus volunteers

Hospital E — 200 beds
head physiotherapist
1 staff physiotherapist (part time)

Levels of Authority

The number of levels of authority relates directly to the size of the department, and the types of rehabilitation medicine performed through it. Both size and specialization are no doubt influenced as well by the importance attached to this kind of therapy by a particular hospital. Rather obviously, for example, rehabilitation medicine has established itself well at Hospital B. At Hospital E, however, the department is short-staffed, lodged in two ill-equipped basement rooms, and overworked. Many doctors are reported to be ignorant of or uninterested in psysiotherapy, often taking no notice of their patients' progress or merely sending their patients down to keep them happy.

In terms of authority, each department was organized somewhat differently. Hospital B presented the most complicated organization chart. All members of the department were responsible to the chief physiatrist and to any other medical men working in or about the department. Physiotherapy, occupational therapy, speech therapy and rehabilitation nursing were considered parallel sub-units. Within each, distinctions were made between supervisor and assistant supervisor, staff therapists

(some may be "senior" therapists) and students if there were any. All four of these subdepartments were stationed in the same unit of the hospital (with the exception of the "psychiatric" O.T.'s). The four supervisors met daily to coordinate the affairs of the department, especially patient care. Each therapist was directly responsible to her immediate supervisor, who was in turn directly responsible to the chief physiatrist.

Again in contrast, Hospital E presented the simplest organizational structure, since there were only two physiotherapists in the hospital, one of whom was designated head therapist.

The remaining three hospitals were somewhat similar. In each case, only physiotherapists worked together in the rehabilitation department. Occupational therapists, if any, were stationed in psychiatric units and were responsible to the medical supervisors there. Among the physiotherapists a distinction in terms of authority and responsibility was made between chief, assistant chief, and staff physiotherapists.

In the remainder of the paper, discussion will be restricted to physiotherapists unless otherwise stated.

Characteristics of the Work Situation

Each hospital may not do all the kinds of treatment involved in rehabilitation therapy as described above.

At Hospital A, the major part of the work done remains in the realm of orthopaedics and "chests", though a physiotherapist may be assigned to a ward or unit (for example, kidney unit or obstetrics and gynaecology wards). Gym exercise and electrotherapy are done but there is no large pool for hydrotherapy.

At Hospital B, almost every treatment is put into practice. Physiotherapists rotate through electrotherapy, hydrotherapy, orthopaedics, medical wards, general surgery, neurological, cardiovascular and plastic surgery wards, and so on.

At Hospital C also, physiotherapists do a wide range of treatments, rotating through the wards and the unit itself. However, electrotherapy and hydrotherapy treatments are somewhat limited because of lack of space and outdated equipment.

At Hospital D, treatments are mainly confined to orthopaedics and exercises in the gym. Some electrotherapy and "chest" work is done by the physiotherapist; the students work on the wards.

At Hospital E, due to the staff shortage, no treatment is given to patients on on the ward. Limited equipment, space shortage, and outdated machines combine to restrict the types of treatment that can be given in the unit itself.

Apart from the treatment of patients, staff members may be involved in the teaching or supervision of students, demonstrations on the ward, staff meetings, lectures or committee meetings.

At each of the hospitals, both inpatients and outpatients are treated, usually in about equal numbers. The number of treatments done varies with the size of the hospital, the number of therapists, and the willingness of doctors to request treatment for their patients.

Rehabilitation departments usually operate by a requisition system similar to that used by several other paramedical departments. The strictness with which this is upheld seems to relate to the size of the hospital and the complexity of the department.

Hospital B's requisitions are signed by the doctor and sent to the department. Each physiotherapist knows which area she is working in ahead of time due to the rotation schedule. The requisitions are sorted out on this basis. On the wards, the therapist tries to get around regularly to every patient, and often acts entirely on her own initiative in this. Additional work is allotted by the supervisor if required. The situation is the same at Hospitals A and C, although at the former, the doctors frequently may write "routine pre-op and post-op" on the charts, and the physiotherapists or nurses fill in the requisition and sign it. With outpatients, the doctors often telephone their instructions and the physiotherapists make up the requisitions.

In the two smaller hospitals, requisitions are not necessarily required to begin treatment. At Hospital D the doctors telephone instructions or leave the choice of treatment to the discretion of the physiotherapist. The head physiotherapist is trying to introduce stricter standards with regard to the requisition process since the doctors usually telephone rather than send a written requisition.

Since their treatments can be scheduled, physiotherapists typically work an eight-hour day. However, as they become part of the "team" working with very ill or surgical patients, their services are beginning to be required evenings and week-ends. Some hospitals rotate a few physiotherapists through these shifts.

In hospitals with a fairly large staff, physiotherapists generally work on a formal or informal rotation basis, staying in one ward or unit for about a month. At Hospital B, the changeover is automatic, while at Hospital A the head physio-therapist may leave a staff member permanently where she is most capable and happy.

Specialization and Division of Labour

In one sense the division of rehabilitation into as many as four areas represents in itself a type of "specialization". Within each of these areas, we generally found little further specialization. One notable exception is the special work of the occupational therapists in psychiatric units. By contrast the physiotherapists were usually expected to be able to do treatments of all sorts. However, in one case (Hospital B), a physiotherapist was actually "specializing" in the treatment of arthritic and rheumatic problems.

In general, then, the work load can be divided equally among the staff therapists. Those in supervisory positions have additional or completely different duties — administration of the department, teaching and supervision of staff and students, hiring and firing, solving personnel problems, and coordination of the department with other departments. In the smaller hospitals, the head physiotherapist usually carries a full patient load as well as extra teaching or administrative duties.

Supervision and Control

The supervision of therapists is rarely of a formally structured nature. It is more likely to be informal and fragmentary. As one supervisor commented, "Professionals are difficult to supervise because they don't wish to be supervised." One respondent said, "You are supervised as closely as you want to be"; another said, "You are supposed to have a conscience in this business." Added to the independence desired and sought by professionals is the independent and individual nature of therapeutic treatment itself. Moreover, the staff are often scattered one by one throughout the hospital.

Indirect means of supervision are possible and are utilized. The chief therapist may make it her business to keep in touch with as many doctors and head nurses as possible about the work the physiotherapists are doing. She also may check personally the cards on which each patient's treatment is recorded. Patients may complain to their doctors, or the doctors themselves may complain to the physiotherapist herself, or to her supervisor. In any case, the physiotherapist always realizes that the results of her efforts will be evaluated by the medical man, especially if he is keenly interested in the progress of his patient.

Students and new members of the department are given much more direct supervision. Students are always responsible to all other members of the department above them. New staff members usually are kept in the department so that the supervisor can judge their abilities before sending them to work independently in other parts of the hospital.

Probably the therapist's code of ethics as a member of a medical profession exerts individual internal control; however, its effectiveness is impossible to measure.

Staffing the Departments

Qualifications of the Staff

Rehabilitation medicine differs from most other paramedical occupations in that its practitioners are often university trained. The fact that it requires a higher education is one of the reasons it is considered a profession by its members. Almost all of the physiotherapists and occupational therapists sampled had the equivalent of grade 13 plus a three-year course either at a university or in a hospital. (The speech therapists each had a B.A. plus a two-year university diploma course; the rehabilitation nurses each had an R.N. plus a one-month university course.)

The students in some of the departments were doing the interning required for their university courses. In some cases, therapists take extra courses of various kinds beyond their diploma.

In addition to those trained in Canada, we met physiotherapists trained in England, Scotland, Germany, India, New Zealand, and South Africa. In each country the content or approach of the specific training program differed slightly, sometimes combining university and hospital training. The University of Toronto offers a combined three-year diploma course in physiotherapy and occupational therapy. (One woman got a diploma in occupational therapy *only* at the University of Toronto in the 1940's.)

No matter how many years of education or experience a foreign-trained physiotherapist has had, she must write the Canadian examinations after a year of employment in Canada. Physiotherapists from Britain, South Africa, Australia or New Zealand are excepted from this rule. Both German and Indian girls expressed disapproval of this policy, not only because of the cost and inconvenience, but because they felt they were as well qualified as girls trained elsewhere.

Some general differences in training were noted by several of the respondents. British girls were said to have better practical training than Canadian girls, although they might be more rigid about innovations. Girls trained in Germany are apparently better in exercise and massage than electrotherapy. As one girl put it, Canadian girls are more "machine-minded".

Only one interviewee had had no formal training in physiotherapy at all. This woman was the lone assistant to the physiotherapist at Hospital D and had begun as the department's secretary. She still carries out secretarial duties as well as many of the basic treatments and exercises.

Recruitment

As has been indicated, hospitals rely on therapists from other provinces and countries as well as on those trained in Ontario.

TABLE 14

Physiotherapists and Occupational Therapists by Country of Birth

Hospital	Canada	U.K.	Germany	Other Common-wealth	Other
A		2	2	1	
B	12	5		3	1
C	2	2			
D	1	2			
E	1				
Total	16	11	2	4	1

Although a significant number of therapists have come from other countries they are not necessarily permanent immigrants to Canada. Physiotherapists as a whole are highly mobile and often come to Canada to work for only a year.

The smaller hospitals in areas remote from large urban centres often have trouble attracting Canadian graduates. Canadians seem to prefer to travel, or live in a large city. Ottawa is well known as a difficult place to attract single, husband-hunting Canadian girls. Foreign physiotherapists, however, knowing nothing about Canada are more likely to gravitate towards the nation's capital.

Usually the Canadian-trained physiotherapist is Canadian-born. Many of those in our sample were trained at the University of Toronto.

Most personnel recruited are female. In all but one case, the physiotherapists contacted were women. The man was a graduate from Britain, where many more men enter this field. Like nursing, physiotherapy has traditionally been relegated to women in this country. In fact, one of the Canadian schools has only recently lifted a ban on male students. Although salaries are on the whole higher than those of other paramedical personnel, they are still not comparable to those of other university-educated medical people (such as nurses). This, too, probably helps account for the insignificant number of male therapists.

To recruit staff hospitals advertise in local, national, or even international papers, and in the association journal. Another source for some hospitals is their own students. Hospitals in small towns may offer higher salaries as a means of attraction.

Retention and Career Development of Workers

Attrition rate, turnover, opportunities for advancement and job satisfaction may all be affected by the presence or absence of informal training, the availability of refresher and/or advanced courses, hours, salaries, and working conditions.

As in several other paramedical occupations, opportunities for postgraduate courses or other refresher courses are limited. Courses may be taken in "amputees", for instance, but these must be done on the physiotherapist's own time and usually no reward in terms of promotion or salary increase is forthcoming immediately on completion. The new courses being given in a few places in the U.S.A. on proprioceptive neuromuscular facilitation are costly, and it is necessary to apply for them several *years* in advance. A physiotherapist with several additional courses to her credit *might* possibly improve her eventual chances of promotion, but nothing is guaranteed. As a result, there is little incentive to advance and to keep up.

Extra provision for informal training on a regular basis was made only in Hospital B, and then only on a small scale. Weekly staff meetings were held, at which time the chief physiatrist tried to bring his staff up to date on the latest developments. The monthly meetings of the Canadian Physiotherapy Association also provide an opportunity for catching up, for comparing techniques and sharing information. There is, however, little participation in the activities of the Association.

TABLE 15

Therapists by Number of Other Courses Taken

Hospital	None	One	Two or more
A	5		
B	n/a		
C	4		
D	2		
E	1	1	
Total	12	1	0

Therapists have few complaints about hours since, for the most part, they work a regular eight-hour day. They are usually satisfied with the working conditions, provided they are not short-staffed. If problems of personality interfere with staff relations, it is fairly simple to get another job. As one physiotherapist said, "I can get a job anywhere in the world."

The possession of a fair degree of professional independence and this knowledge of "I can get a job anywhere" combine with factors of age, sex, and marital status to make physiotherapists a very mobile occupational group.

Most practising physiotherapists are in their twenties and thirties. Those in supervisory positions or in more remote hospitals tend to be older and somewhat more stable.

TABLE 16
Therapists by Age

18-22	5
23-27	16
28-32	5
33-37	0
38 plus	8

Most of the recent graduates are single and although they do not seem to be husband-hunting as desperately as some of the laboratory technicians, they *are* on the lookout. Perhaps they are not as eager to be "rescued" from their work by marriage. Physiotherapists are likely to keep on working after they marry, at least until they have children. The older women in the profession tend to be single or married without children.

TABLE 17
Therapists by Marital Status

Single	19
Married, no children	13
Married, one child	1
Married, two or more children	1

On the whole, then, physiotherapists are a mobile group. One director estimated that there is a 50 per cent turnover every two years. Some areas, especially in some big cities (and also isolated spots) have even higher rates than this. At Hospital B, for example, the turnover was judged to be 80 per cent every two years.

The question of vertical mobility is different, however. Because of the high rate of turnover, those who get promoted are simply those who remain, rather than those who are most capable or qualified. A long-stay physiotherapist may come to expect promotion as a right simply on the basis of her length of service. In one case, where ability was promoted ahead of seniority, there was some negative reaction from staff members.

The actual number of steps on the ladder of promotion is limited. One can move through the following positions: staff physiotherapist, senior physiotherapist, assistant head, head physiotherapist. Some hospitals do not make much distinction between them in terms of responsibilities. Except for supervisory positions, there are only slight increases in salary, which usually occur during the first five years of service; but even these then level off. This is quite a sore point with some women who have had a number of years' experience and have reached their highest possible salary by the time they are thirty or so.

How satisfied are physiotherapists with their jobs and choice of career?

Generalizations are hazardous. Some chose physiotherapy and are "very satisfied" with their career. Some fell into it. Some eliminated the long, rigorous years of medical training or the drudgery and inconvenience of nursing, added the prestige of a university education — and came up with this. Most stated that they are "fairly satisfied" with their present job and occupational choice. As in any occupation, there are those who "love every minute" and have dedicated the better part of their working lives to a career, and those who consider it merely a means to a pay cheque until marriage.

The main complaints that emerge from numerous respondents concern salary, and the ineffectiveness of the CPA in doing anything about it. Otherwise, the physiotherapists enjoy the amount of independence they are granted as professionals — and indeed would like to see more recognition of that status. Several object to the fact that the course is combined with occupational therapy at the University of Toronto and is thereby too broad, and also that it is a diploma rather than a degree course.

Role of Occupational Association

In order to practise in Ontario, every physiotherapist must register under the Drugless Practitioner's Act. Recently a regulation requiring every physiotherapist to be a member of the CPA also has come into effect. This Association levies annual dues, holds meetings several times each year, and sends out a magazine. In general, most physiotherapists were willing to recognize the efforts of their Association as having some value. Nevertheless, the fact that the group cannot enforce its salary scale is a frequent complaint. Meetings are poorly attended and little interest is taken in them. Rather than being antagonistic, physiotherapists seem to be indifferent to the efforts of their organization. They are dissatisfied but rarely take any action to change things. Most respondents favoured some form of collective bargaining but rejected the notions of union organization and strikes.

Chapter 11 Summary

Generalizations

In order to conform to the terms of reference of the Committee on the Healing Arts, the summary is couched in terms of the specific occupations whose titles appear as section headings. Such a summary does not do full justice to all the kinds of facts unearthed by this research venture. Throughout the report two other foci of attention keep jostling for the reader's attention. In the interests of brevity they will merely be noted here.

The first is the capacity of the modern hospital to generate new kinds of specialized tasks and to subdivide these almost ad infinitum. The hospital is now a highly departmentalized affair. Each of these departments represents a distinct specialization, followed by a clustering of the occupations required to carry out the specialized tasks. The success of these efforts results in an attack on further medical problems, and this involves new skills and knowledge being put to new uses. Not only do specialized occupations arise by this process but so do specialized departments; not only do they both emerge and develop, they also subdivide.

The potency of the hospital to generate departments as well as occupations is dramatically illustrated by the technical laboratories, the inhalation therapy units, and the heart laboratories and the isotope units. In each of these areas new scientific knowledge and new technical expertise are linked with revised notions of service to the patient, with the result that the hospital adds to its already complex character. From this perspective, the several distinctive paramedical occupations we chose to study are essentially aspects of the growth of the hospital per se.

A second focus of attention that obtrudes on the reader is the age-old competition between men and women for jobs — the effort to keep clear what is in a "man's world" and what is in a "woman's world". Historically, medical practice has been a masculine prerogative, while nursing has been an extension of womanly activities. This division has broken down in part, but only in small part. Historically, the doctor has earned a high income, large enough to support a substantial household. By contrast the nurse has worked for a salary large enough to support a woman while she secures a husband, but certainly not large enough to lure men into the field of nursing.

In all the occupations we have studied, the work has come to be identified with one sex or the other. Men seem to enter these under two kinds of circumstances. If the work can be defined as a highly technical set of tasks with emphasis on

complex, dangerous equipment and/or on developing bodies of knowledge, men appear on the scene. Or, if the occupation can be used as a back door to administrative work, men arrive in numbers. Otherwise the paramedical occupations are a grand experiment in segregation of the sexes.

In turning to the several occupations which form the core of this report, the reader may feel that they are so varied and are so subject to change that generalization about them is impossible. Certainly both the technology of medicine and medical science are advancing so rapidly that most of these occupations have had no chance to stabilize. Rather they are subspecializing with great rapidity and, in their wake, are casting up new types of departments and new systems of administration to cope with the subspecialization. One might readily assume that the speed of these changes makes generalization truly hazardous.

Nevertheless several sorts of conclusions can be drawn. In general, one can note that these new occupations have come into existence because of the changed styles of practice of the doctors. It is the doctors who have in large part generated the paramedical workers; it is they who make use of them. Both now depend on the other; both are parts of the medical team.

The Status Gap

The first point for specific emphasis is that there is an enormous gap between the two parts of the team. Between doctors and the paramedical occupations there are fantastically large differences in income. Doctors stand at the top of the income scale in Canada. Many of the paramedical personnel are close to the foot of the scale. Whereas it can be argued that both are essential to the present-day practice of medicine, it is obvious that the rewards are highly unequal. This holds true for prestige as well as income. The doctor stands on a pinnacle of prestige and esteem in our society. His helping technicians share this to an extremely attenuated degree. There is a comparable gap in the body of knowledge available to each category. The intellectual component in medicine is extensive and esoteric; for the helping groups it is slight, and it shades off very quickly into a body of "know how" rather than "know what". This is mirrored afresh in the training framework of each. For the doctor it is likely that several years of college plus four of medical school plus as many as six in the hospital precede his emergence as a functioning member in his field of work. By contrast, the period of training of the paramedical personnel is notably short, and early in this training they are already functioning on the job. In brief, the medical team, from the perspective of the paramedical occupations, displays an enormous status gap. It is not a graded sequence, nor a continuum of occupations. It is made up of the high and the low, with not much in between. There is no other kind of work in our society where the gap between those who provide the major service and those who help is correspondingly wide. The one

segment lives in, and is largely recruited from, the upper class levels of society; the paramedical workers are drawn from the lower levels and have very little opportunity, through their work, to climb much higher.

The Short Supply of Recruits

A second general observation concerns the difficulties of recruitment into the paramedical field. The pool of recruits must be described as meagre. This is not because these occupations require a specially qualified type of applicant of a distinctly rare sort. Rather it is because of the immense number of competing occupations actively seeking the same sorts of recruits demanded for paramedical occupations.

On the demand side we are dealing with an expanding industry. The whole health field is growing rapidly. Within the hospital, the paramedical occupations appear to be developing somewhat more rapidly than the services in general. These occupations seem to be expanding not only in a general way but along new specialisms. As long as technical progress continues, there is little likelihood of any decline in the demand for such personnel.

The shortage in supply is compounded currently by the fact that our society has long tended to look abroad for technically trained personnel. This is a general kind of dependency, by no means restricted to the medical sphere. Our training facilities have lagged woefully behind our need for technical people. Among the paramedical people the greatest shortages occur among the more highly technical types. It is much easier to recruit the clerical and personal service types than the technical and scientific types.

The shortages tend to force recruitment outside Canada to those parts of the world where technical education is more widely stressed. The search for laboratory technicians in western Europe and the Philippines underscores this point.

The Dominance of Unmarried Women

The paramedical occupations are staffed mainly by unmarried women. In this, as in the points noted earlier, there is a gap between the doctors and their helpers. Few of the doctors are women; few of their helpers are men. Medicine attracts the ambitious boy who vigorously seeks a lifetime career. The paramedical occupations attract the young girl, usually one who feels no pull towards an enduring commitment to this work.

These young recruits have been relatively satisfied with modest sorts of incomes. For them the work is primarily a stepping stone to marriage; it is an interim style of work career. They do not contemplate the sort of income which would support a family household. They do not press for the sort of income on which one could live out the successive stages of a work life, including old age and retirement.

Neither, as one might expect, are they deeply concerned about an intensive training, highly specialized and continuous. They do not view themselves as investing in their own training on the expectation of realizing later on that investment. Their perspective is that of a brief training with early access to employment at the maximum figure for that occupation. Indeed, in most cases, they expect to start immediately in paid learning as the initial step towards paid employment.

The paramedical workers can be categorized as mobile types. They move around a good deal. Their mobility has various dimensions. For many of them the level of income is adequate to let them travel, even intercontinentally. The relative assurance of finding work at the other end of a trip makes this sort of movement possible and attractive. Moreover, they seem to build only weak attachments to their places of work. They develop no strong identification with a specific hospital. In this sense they are "free" workers. They seem also to have little sense of an orderly advancing career. They soon reach the top of their pay scale, and there are no further rewards for continuous service in one institution. This lack of identification with an extended career makes it relatively easy to change jobs for relatively trivial reasons. Neither the appeal of a specific hospital nor that of a durable career within one seems to be an important concern to these workers.

The Weakness of Occupational Associations

The paramedical workers evince very little enthusiasm for union organization or other forms of worker association. Women workers have traditionally shown little interest in association and collective bargaining; middle class women workers strongly resist the idea of using vigorous measures to bargain with employers.

The paramedical workers in our survey were uniformly apathetic towards the formal association of their occupational group. Few could muster enough enthusiasm to attend meetings. Fewer still felt any urge to make personal sacrifices for the association, or any compulsion to run for office in the association. In general the association's activities did not enter their time budgets. Few of them found such activities exciting or compellingly satisfying.

Neither did they view the association as a potent device for making changes in their work lives. In particular, they did not see that the association could make a significant contribution to salary discussion. The recommended pay scales of the associations seemed very distant and ineffective gestures. In general they thought of worker organization as relatively powerless.

In a similar vein they did not seem to envisage an organization as something that might raise the standards of the occupation. There was little feeling that it might contrive retraining and upgrading schemes to lift the general level of competence of the members. Nor did they seem to entertain the notion of further

training that might lift individual workers to a higher level of competence. The notion that the association could make possible an upward career did not seem to have sunk roots among these workers.

Employee Status

The clearest way to picture the paramedical workers is simply as the employees of an employing hospital. They are first and foremost representatives of the "employee" society.

The impact of the hospital on their work lives begins at the point of their recruitment into the training process. The hospital, through its training school, takes the initiative in contacting the student in the high school system in order to steer him into the training program. It is the institution which seeks out the student rather than the student who seeks a path to the institution.

Generally speaking it is the hospital which generates the training program. It determines the nature of the program, its length, its content, and its pace. It provides the manpower to staff the training program. As noted earlier it subsidizes or supports the learner during his period of training. It shifts him, step by step, from the training program to the work situation.

The hospital is to a very large degree the sole sort of employer for the paramedical personnel. It alone can supply him with the tools of the trade for him to carry on his work. Obviously these workers can accumulate none of those tools as their own personal property. Hence the notion of such workers acting as "independent entrepreneurs" is, with a few exceptions, a bizarre idea. The work is well nigh inseparable from the hospital milieu in which it is carried out.

As far as the planning and execution of work are concerned, these proceed under the authority and supervision of the hospital. The paramedical worker takes orders from, and accepts the supervision of, a set of officials designated by the hospital. The officials who direct and supervise are part of the bureaucratic hierarchy of the hospital. The paramedical worker is controlled by the line officials, rather than the medical staff personnel in the hospital. In this respect his status is very much that of an employee in a bureaucratically organized institution.

The paramedical worker is responsible to, and accountable to, the hospital officials as far as his work is concerned. The hospital officials, in turn, are accountable to the patient for the quality of services provided by the paramedical worker. From this perspective it can be stated that the hospital "practises medicine" — i.e., makes services available to the patient.

The Wide Range in Styles of Techniques

Some of the paramedical occupations involve highly standardized techniques, whereas for others the technique varies from one location to another. Wherever

the technique to be learned is officially recognized over a wide domain, the place for learning the technique need not be specified. On the other hand if the technique varies from hospital to hospital, the training in it must be carried out close to the place of work.

One of the highly standardized techniques is that of coding disease entities for the reports to national or provincial agencies. In these the established form of the report necessitates that all hospitals, from one end of the province to the other, use the same coding rules and practices. Except for the hazard of a bilingual requirement in some parts of the province all these workers will be employing a highly stylized technique, and presumably could be trained anywhere in the province.

At the other extreme are the employees working in newly established and developing technical laboratories. A case in point is the heart laboratory technician. These techniques may vary from one laboratory to another, depending on the sophistication of those responsible for the laboratory and the type of technical apparatus currently used. In such cases it is well nigh nonsensical to contemplate a training institution for such personnel apart from the actual work situation. The only possible teachers are the personnel involved in the research who, ironically, are busily engaged in rendering the current technical operations obsolete rather than stable.

It seems clear that the decisions regarding the locale of training and who can teach the recruits will depend very much on whether the techniques to be taught are highly stabilized or currently evolving.

Variety in the Organization of Work

Some of the paramedical workers approximate "solo practice" as the term is used in medicine. Others are involved in "team" work or "group" practice. There is a great spread between these two extremes.

At the one extreme one can envisage the independent practitioner who works in highly autonomous fashion. The physiotherapist would approximate this model. She can work in relative seclusion and isolation, the only requirement being that she and her client get together. Incidentally, this is a highly prized model for carrying out work, even though there are few places where it is possible to make it operate.

To an increasing degree, medical service demands a team effort with an effective coordination of an array of different technical specialists. Heart and kidney transplant operations are dramatic examples. These involve small armies of specialized personnel each bringing markedly diverse skills which they employ as aspects of a complex operation. None by itself — for example, monitoring an anaesthetic device — has relevance. Indeed the learning of such techniques is very much a matter of anticipating correctly what other members of the team are doing.

It is clear that while the learning experience for the independent worker can go on in relative isolation, the training of many of the paramedicals must acquaint them early with the demands of teamwork.

Varieties of Discipline and Authority

In all work situations there is a need for some type of authority and discipline. In the case of solo practitioners there may be a minimum of giving orders and taking orders; when we deal with work teams, however, all members must be prepared at times to respond as parts of a precisely drilled unit. These are the two polar situations. In the case where an aggregation of different workers must be able to act as a unit, promptly and without friction, part of their training must certainly be in the area of "coordination". They must learn the specifically social skills of responding to orders and commands with alacrity, and without ill-will, annoyance or hostility. These are important skills, which need to be learned much as are technical skills. On the other hand, it would not be correct to infer that solo practitioners avoid the necessity of comparable learning. For them the skills are better conceived as self-discipline — a set of skills and attitudes which permit the worker to deal with his client without annoyance or hostility, no matter how uncooperative or disagreeable the latter may be.

Clearly these two kinds of discipline are far from identical. Indeed there is much evidence that workers trained for solo performance, in which they learn self-discipline and autonomy, may be thereby unfitted to work in team fashion, or to function comfortably as members of an integrated work unit. There is, of course, an anomaly here: more and more occupational groups are tending to model themselves as autonomous workers ("professionals") at precisely the point in time when they are called upon to function as parts of a corporate enterprise. Clearly the aspirations of such groups may deviate widely from the realities of workable arrangements.

Paramedical workers reflect a wide spectrum in these matters. Some, such as physiotherapists, may exhibit a maximum of autonomy regarding fellow workers and associates, and presumably must learn to handle the relationship with the patient as a matter of personal responsibility. Others, such as radiological technicians, work in continuous interaction with a wide assortment of related workers, and must gear their activities to the others in standardized ways. There are still others, such as the heart laboratory technicians, whose work procedures are of a newly evolving sort, who work in a situation where both doctors and paramedicals are contributing to the ongoing development of new techniques. For the latter the lines of authority are far from definite.

Variety Among Work Places

It is generally true that medical institutions tend progressively to conform to uniform patterns. The existence of a standardized body of medical knowledge

and belief constrains medical institutions to develop common patterns. Nevertheless, behind this uniformity substantial variety can be observed.

To begin with hospitals are differentiated by language and religion, especially by the latter. As a consequence there are differences, subtle and not so subtle, in the ways in which various technical services are organized. This is most noteworthy at the administrative level; hospitals controlled by religious orders incorporate religious personnel into the paramedical departments, thereby rendering the latter somewhat more complex, and creating some near-monopolies in the administration of such departments. This reflects on the daily work of the department and affects the career opportunities of technical workers. Religion is by no means a random factor in the inner organization of hospitals.

Other variations stem from the imprint which a dominant figure in the medical world can give to a hospital. Since the hospital system is to a large degree a recent affair, the impact of innovators still colours the patterns. The orientations of the local innovating officials tend to endure, particularly in the areas of the most recent technical changes. Hence a worker trained in one institution may not be readily transferable to another. To this degree the hospitals do not comprise a single labour market for such workers. Such variations limit the extent to which any one single system of recruitment and training can provide the variety of workers needed to staff the differentiated institutions.

All of the aforementioned items exert an influence on the strategies of recruitment and training operative among paramedical workers. Any defensible system for recruiting and training must take into account, among other things, those discussed above:

1) the profound prestige gap currently existing between the medical profession and the paramedical occupations;
2) the increasing competition for a restricted pool of recruits;
3) the one-sex imbalance in the paramedical field;
4) the relative ineffectiveness of worker associations among paramedical workers;
5) the relegation of most paramedical workers to the status of "employee";
6) the wide range of styles of work techniques among the paramedical occupations;
7) the varieties of style of work organization;
8) the variety in patterns of discipline and authority;
9) the variations among places of work.

Some of these generalizations deal with the ways in which paramedical workers are deployed — spatially, technically and organizationally — in the performance of

their respective tasks. Others have to do with the general patterns of training and recruitment that have arisen among these workers. With regard to these matters, and in particular the training and recruitment of these workers and their deployment geographically, it seems useful to propose some guidelines for policy.

Conclusions

In the light of what has been noted in the various sections of this report, the following general conclusions are offered.

Recruitment should be focused on the facts of a rapidly growing industry. Health is now a major industry in our society, and seems likely to continue to expand. It belongs to the growing sector of the economy, the service industries of modern society. Health, like education, carries an increasing importance in the eyes of Canadians. One might add that it seems to be developing a growing urgency.

The health field is shifting away from a pattern of a small, elite medical profession, supplemented by devoted nurses and other helpers. It is on the way to becoming a mass industry, in which the workers seek the usual rewards of mass industry, and pattern their work lives accordingly. It would be an anachronism to seek to recruit paramedical personnel in terms of a classical professional model, or in terms of a calling to dedicate one's life to service on the basis of pathos.

Recruitment should be focused on the main facets of the industry — i.e., large organizations for medical care, technical competence, administrative efficiency, scientific knowledge — and on an interest in applying these in a service capacity.

Recruitment should be focused on durable careers. The fact of a continuing career should supplement the emphasis on health as an important industry.

There may be fields of work in which casual careers are appropriate. There may be fields in which occupations are merely stepping stones to marriage, or to a more substantial kind of career. (School teaching was once so viewed in our society.) Such career orientations are progressively inappropriate in the health field.

A massive industrial field such as health offers the possibility of a durable career for the worker. The field will come more and more to depend on a body of such workers. It will require workers who envisage a long-term commitment to their work and a readiness to contemplate retraining as an aspect of it.

A durable career means more than just a long work span. It involves two other notions: increasing technical expertise and increasing responsibility, in some blend or another. A job which reduces itself to the routine performance of repetitive tasks can hardly be viewed as a career; a low ceiling on responsibility similarly precludes the development of a sense of career. It is a durable career in this three-fold sense which should be held before the eyes of potential recruits.

Moreover, a lengthened work career, in its own right, has significant consequences bor both recruitment and training. The more durable are the careers, the less is the need to recruit and train replacements. Adding only a few years to the paramedical careers would drastically reduce the costs and efforts of recruitment and training.

Recruitment should focus on careers based on an expanding technology. The current growth of the health industry rests in large part on the fact that it is technologically possible to do ever more for the sick person. Medical care systems are becoming increasingly technological; they require recruits with a technical bent.

In our society there has been a tendency to use people trained elsewhere (outside Canada) for the technological aspects of medical care. Apparently our own educational institutions have not managed to orient young people towards careers in medical technology. To get enough of the right kind of recruits the medical industry should make its needs, and opportunities, known to the educational field in a more energetic way. The medical industry cannot afford to wait for recruits to appear — it should make it possible for potential recruits to learn that careers of this sort are available. This means that knowledge about the job opportunities in these technical fields should be fed back forcefully into those parts of the school system attempting to offer technical education.

Recruitment should aim at incorporating more men into the paramedical occupations. The preponderance of women, and especially younger girls, in these occupations has been noted and emphasized. This pattern has long historical roots. However, there are no very strong arguments as to why this pattern should endure.

There are good grounds for assuming that men would help to generate more durable careers in these occupations. Their effect would be twofold. Because they are, to a much greater degree than women, interested in continuous life-long work careers they are more likely to press for the upgrading of workers, a rationalized work organization, and collective bargaining arrangements to facilitate these movements. Second, their example in these matters would strengthen the efforts of the women workers who currently wish to develop durable careers in these occupations. Even though the men offered some competition to women workers they would help improve the future for both.

Men workers are likely to respond more positively in the immediate future than are women to the technical appeal of such occupations. In our society, in contrast to many other highly developed societies, there is considerable aversion on the part of girls to plunge directly into technical courses or professional-technological fields. Men workers would be more prone to help innovate technical change in such occupational fields, and adapt to the technical environment.

The presence of men workers would help to ease certain administrative difficulties. There are many points in the work day of the paramedicals where emergencies create pressure and/or the routine of work becomes hectic. Men workers frequently play an unannounced but significant role in handling this feature of administration. By contrast a predominantly or exclusively female work force faces a hazard in this respect. Although men would probably be competitors in such situations, they would also function as work models for women committed to durable careers.

The Ontario Hospital Services Commission should take the initiative in pursuing the above goals. In order to stimulate action in the recruitment and training of paramedical personnel, the OHSC should take a central role. There may be objections from persons who would be alarmed at this extension of an already massive and powerful organization. The suggestion stems, however, from a recognition of the weaknesses of alternatives.

One alternative is to leave the problem with the formal occupational associations. At the moment these organizations show little promise. They are weak in resources and poorly equipped to mount the sort of policies and programs needed to effect these changes. They are relatively inconsequential in the eyes of many members of the occupations. Moreover, they are fragmented to a degree that would make collective programs of recruitment and training all but impossible. Even in the case of the nurses, whose numbers, budget, and traditions make for relatively bright prospects, the effort to carry on recruiting and training programs has been far from promising.

Another alternative is to turn the problems over to the individual hospital. Since it has the responsibility of providing services to the patient, it is under strong pressure to work vigorously on both problems. It is the very lack of success of individual hospitals to solve such shortages, however, that constitutes the nub of the problem. And by competing with each other for recruits the individual hospitals do little to improve the general situation.

Are there any other possibilities? Perhaps the new technical colleges could undertake this responsibility. Given the vast number of competing demands on their plans and resources, it is doubtful that they could give high priority to the solution of the health industry's problems. The colleges could conceivably be instrumental in training personnel at certain levels. But the stimulation of students to select such courses of training, and the pressure to provide such programs, must come from bodies outside the colleges.

The arguments for the OHSC playing a central role can be stated briefly. First, it already stands at the hub of the most consequential institutions of medical care. It has had a decade of operation in which to consolidate its original tasks and develop an effective administrative structure. Hence, the OHSC is presumably

the agency best equipped to tackle this responsibility. In the second place, it and the hospitals it controls are increasingly involved in the business of providing direct services of a medical character to patients, and they are beginning already to develop a concern about the quality of services. Highly important components of such services are the quality of the recruits to the paramedical occupations and the character of their training. Third, the responsibilities of the OHSC are far from static; in the effort to provide hospital care it is moving progressively towards providing supplementary and auxiliary services not usually supplied by hospitals, such as home care. Its mandate is expanding; therefore it could move easily into the matter of the recruitment and training of paramedicals. Finally, the OHSC is in an optimum position to assess the needs of the whole system as far as the demand for paramedical services is concerned.

The Ontario Hospital Services Commission should tackle the problems of recruitment and training on a regional basis. In suggesting that the OHSC play a central role in the recruitment, training, and initial deployment of paramedical workers, it is important to avoid the dangers of recommending a highly centralized system of operations. Ontario is a discouragingly large and varied entity. Hence, it is hardly likely that a single overall provincial plan in such matters would be effective. The dangers of centralized patterns have emerged clearly in the sister area of "educare", where the attempt to centralize the recruitment and training of high school teachers in a single structure (the Ontario College of Education) has not been successful; new ways have had to be sought to provide competent teachers to the sprawling system of high schools the province has evolved.

It is easy to indicate why the province cannot be viewed usefully as a single unit in the planning of its medical service industries. Its present structure is a set of growing metropolitan conurbations, each acting as a potent magnet to the population around it. This is one central feature of the province. The other is the fact of large numbers of small pockets of population, many of which are remote from the major metropolitan centres. The planning for medical services must try, as far as possible, to fit this grid of population distribution.

As noted earlier there are already various movements under way to impose a regionally defensible pattern on the health field. Insofar as they constitute a rational pattern, they should be encouraged and integrated. Three such movements deserve further comment.

Nursing training is one case in point. The multiplicity of small hospital-based nursing schools has fallen into disrepair. They no longer provide adequate numbers of qualified nurses to staff the hospitals; in the metropolitan areas the shortages are endemic. To meet these needs a set of distinctive regional schools of nursing is evolving. This is a solution which tries to avoid the difficulties of local efforts without embarking on the hazards of a highly centralized pattern of nurse training.

It is probably too early to attempt any assessment of the regional schools, or of their interdependence with the community colleges on which some of them depend for specialized teachers. As they stand, however, they are a testament to the need for, and acceptance of, a level of planning lying between the local scene and the province as a whole. And it should be noted in passing that the OHSC has been associated, at least unofficially, with this development.

The second point to be noted is the drift of the OHSC itself towards a regional pattern. Community councils are being organized to exercise some planning control over the hospitals of a specific community, and regional councils to give some guidance to still larger units of the province. Some of these are restricted to a single city; others concern a metropolitan area; still others deal with a whole county.

Two of the objectives of this sort of regional planning are to "meet the hospital needs of a community *and the surrounding area as a whole as opposed to isolated individual growth; and to permit the best utilization of available professional and technical personnel*".[1]

The effort to move towards a rational regional pattern is no easy task. The province has been carved into regions by a large number of administrative agencies, each for its own purposes, and few of these coincide. Despite this lack of inspired guides to establishing regional boundaries, the effort continues with undeniable vigour.

The third trend towards regionalization stems from the effort to establish a rational scheme of medical centres for the training of doctors and the prosecution of medical research. As noted earlier, it is now being recognized that each of the four established medical schools is the focal point of a system of hospitals and other services which radiate into the areas surrounding the medical centre. A fifth centre is being organized in an effort to round out an effective system which will then service most of the population of the province.

In a definitive sense, these "health science centres" are the focal points of regions which depend on them for the provision of the wide range of professionals and medical services that currently constitute medical care. In turn, these medical centres depend on hospitals and other medical institutions in the areas adjacent to them to help provide teaching and learning facilities to supplement those directly available in the centre.

Currently, the health science centres in general seem to be moving towards combining the teaching of the medical professional with the training of a substantial range of his helpers. Recognition of the desirability of *training together* the various kinds of health personnel who must later *work together,* especially in hospital

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[1]See Annual Report, Ontario Hospital Services Commission, 1967, p. 6. (Italics added.)

settings, is a foretaste of things to come in the training of health personnel. Thus, the health science centres are becoming the centres of medical regions in an increasingly important way.

What is emerging here is a common interest between two sets of institutions. The traditional medical schools are discovering a broader range of responsibilities for themselves which can be achieved only by taking appropriate action on a regionalized level. At the same time the hospitals are also discovering a need to group their responsibilities on a regional basis and to view their manpower needs in such a regional perspective. These two developments could be nudged closer to one another in order to design a common regional pattern that could help create a systematic scheme for recruiting, training, and deploying the paramedical workers.

In the past, the medical schools largely adopted an ivory tower orientation towards their task, which they viewed as that of training a medical elite — the doctors. There now is apparent a growing recognition that even the superbly trained doctor cannot practise medicine without the ready assistance of a small army of helpers of diverse sorts. This state of affairs is making necessary drastic revisions of medical school policies.

The OHSC has been concerned, during its initial decade, with the difficulties of financing an established set of hospitals. This has led gradually to a concern for the full range of services provided by hospitals, and to a close look at the problems of providing adequate manpower for an increasing array of specialized occupations.

Together, the health sciences centres and the OHSC represent the most concerned, and the most effective, agencies in the matter of evolving the sorts of programs likely to provide a sustained flow of workers into the paramedical fields.

Appendix

The Organization of the Laboratories in the Five Hospitals Studied

Hospital A, Ottawa

In this Catholic hospital, all the different laboratories are coordinated by a Sister who is the chief medical technologist. Her direct superiors are the hospital pathologists who hold cross-appointments at a university medical school. There are no full-time medical directors for any of the laboratories. The chief technologist's authority over each of the laboratories is considerable; they are not autonomous as are the laboratories in some other hospitals in our sample. The Sister in charge has a full-time director of studies who looks after the technician training program. There is one central office and receiving area for all the laboratories. A large proportion of the specimens are received here for distribution to the appropriate departments. All reports on the tests emanate from here.

Size and Composition of Staff

When we visited it, this hospital had fifty-five "technical personnel" associated with its laboratories. This included, to use their own terminology:

1 chief technician
7 charge technicians
18 senior technicians
24 junior technicians
2 morgue attendants
1 university-trained bacteriologist
1 university-trained biochemist
1 university-trained haematologist

Not included in this list are a number of auxiliary personnel such as technician's aides and dishwashers.

Each laboratory has a charge technologist. The bacteriology, haematology and biochemistry laboratories also have on staff a university graduate in the particular field. It is difficult to determine the division of responsibility between these persons and the charge technologists, but it appears that the latter carry most of the administrative and supervisory duties, while the former act more as technical specialists and consultants.

Division of Labour in the Laboratories

Bacteriology

An M.A. in bacteriology is the senior professional full-time staff member. She checks all the reports before they are sent out. The charge technician is an R.T. with ten years' experience and an advanced course in microbiology.

The rest of the staff consists of three senior technicians (two with A.R.T.'s who were hired from Britain), two intermediate technicians, two junior technicians hired from the last graduating class, one R.T. with experience in biochemistry, and two assistant technicians.

The work of this laboratory is the standard, simple bacteriology routine. There is a three-phase rotation from blood serology work, to setting up, to reading and identifying cultures. Both students and assistants work at setting up, but only qualified technicians are allowed to work at the identification task.

Biochemistry

This laboratory has the services of a part-time biochemist from the University of Ottawa. He has a Ph.D. in physiology. They had a full-time chemist until a year ago. The charge technician has an R.T. and six years' experience in other hospitals.

There are two sections to the laboratory: one, the routine section; the other, special chemistry. The laboratory does 150 tests, ten of which are done in the special chemistry section. Normally there are two technicians in special chemistry and nine technicians and two laboratory assistants in the routine laboratory. All eleven technicians are registered either with the CSLT or its U.S. counterpart. Three of them have Bachelor's of Science or of Pharmacy from the Philippines as well.

The technicians in the routine laboratory rotate among six different benches. There is only one autoanalyser which is used for blood sugars and BUN tests. The technician in special chemistry works closely with the chemist. They conduct non-routine tests which occasionally are called for. These include tests for barbiturates and poisons, blood gases and steroids. Many of these tests involve emergency cases for which speed is essential.

Blood Bank

Heavy turnover complicates the situation here. At present there are only four technicians, counting the head technician. She is an R.T. with six years' experience.

The head technician checks the work of the others; she also carries a heavy load of routine work. Her other duties include checking the night technicians' work, cancelling outdated blood and doing special antibody investigations. She also orders the blood from the Red Cross and helps train student technicians.

The other technicians do routine grouping, typing and cross-matching. Because the unit is short-staffed they also do special investigation.

The department has no intravenous nurses but is trying to acquire some. At present the ward nurses, internes, and doctors collect samples and give transfusions.

Cytology

The head technician is a middle-aged man who took his R.T. in 1964. He has a staff of two including one girl trained in the Philippines with a Registered Technologist's diploma, and one assistant technician who can do the work but lacks the education to try the R.T. examinations.

Because of the heavy work load, all three technicians do the same kind of work. The head technician has the usual additional supervisory and training responsibilities.

Histology

The head technician has been working in the laboratories since 1937 and obtained her R.T. in 1941. Her staff includes one senior technician with a British R.T., three junior technicians, an assistant technician, an aide, and two student technicians.

The aide works full-time in the specimen room recording the specimens brought in from the O.R. and the autopsy room by the internes. The rest of the staff do the routine work. There are only three microtomes and these are used by the three senior technicians to cut sections. Only when one of the seniors is absent do the others get a chance to practise this intricate skill.

The senior technicians take monthly turns working at special staining. Unlike other hospitals, there is an attempt to teach everyone this art.

Haematology

The head technician is a young, recent graduate of the training program here. Her staff includes seven technicians with Canadian R.T.'s, two technicians from the Philippines with U.S. medical technology diplomas, and two dishwashers.

All the staff work on the routine, changing tasks every week. There are seven benches. One technician does the setting up, one does stains, one does the haematocrits, one works on haemoglobin and sedimentation rate tests, one on counting, one on the autocytometer, and one on "plutomin" tests. The head technician does the special investigation. She also handles administrative work and the teaching of students.

Hospital B, Toronto

Each of the laboratories in this hospital is autonomous. Most are directed by a full-time staff doctor. The senior man in the laboratories is the pathologist, but

he has no formal authority over any except the histology and cytology laboratories. The laboratories in Hospital B were the largest and most highly specialized of any we visited. The administrator reported a total of 150 technical staff.

Division of Labour in the Laboratories

Bacteriology

The staff includes the medical director, ten technologists, two media-makers, two washers, and two secretaries. There are two senior technicians; the rest are juniors.

One technician works full time on infectious diseases. Aside from her, all the technicians rotate through the different benches. They also spend one month a year each in the sections handling blood serology and T.B. tests. The latter are performed in a separate room.

Aside from this division of labour, there are certain tasks performed by individuals. For instance, one long-service technician works outside the laboratory running the V.D. clinic. He also handles the anerobic jar where there is a danger of explosion. The girl who is unofficial assistant to the charge technician has the job of sending out virus samples to the provincial laboratories.

One of the media-makers is an older man from Czechoslovakia who had at least two years of science at university in his home country.

Biochemistry

These laboratories are highly specialized and expertly staffed. The medical director has done extensive graduate work in chemistry in the U.S. He has two Ph.D.'s in chemistry working for him in two separate laboratories.

A unique feature of this set-up is the fact that the medical director heads up two closely connected laboratories: the biochemistry laboratory, and the metabolic renal unit. These laboratories occupy adjacent but separate space. One Ph.D. heads the biochemistry laboratory and the other the metabolic renal unit.

The biochemistry laboratory has two parts: a methods development laboratory, and a service laboratory. The Ph.D. and two technicians work in the methods development laboratory. When a demand for a new test comes from the medical staff, the laboratory people devise a method, test it thoroughly against the old ones, and pass it on to the service laboratory.

The same Ph.D. is also in charge of the service laboratory but he has an assistant chemist and a chief technician to relieve him of the burden of routine supervisory work. The medical director insists that this man is first and foremost a chemist, and must have time to spend on his technical and innovative roles.

The technicians in the service laboratory spend three weeks at a time at each

of eight benches. The laboratory is highly automated: fourteen tests are automatically conducted by their two big autoanalysers. Now the bottleneck has become the analysis of the graphs produced by the autoanalysers. Technicians have to make these computations at the end of the day; thus they are prone to a certain amount of error caused by fatigue.

The metabolic renal laboratory is headed by a Ph.D. and a chief technician. Six other technicians work in this unit. They rotate tasks every two weeks.

In both laboratories, the only full-time intra-laboratory specialization involves the assistant chemist and the two chief technicians who work almost full time at their supervisory duties.

For the ordinary technicians there is no direct contact with either the patients or the attending physicians. All inquiries from the latter are channeled to the medical director.

Pathology

This department is presided over by the senior medical staff man in the laboratories. It is being rapidly expanded. The cytology section has been in existence only since 1962. An electron microscope section has also been added within the last five years. A neuropathology section is presently being created and a "bone" laboratory will be organized in the near future. At present, however, there are just three sections: histology, cytology, and electron microscopy.

The chief technician in histology is de facto second in command to the medical director in the cytology and electron microscope sections as well. He has forty-three years of laboratory experience. The histology department is divided into a surgical and an autopsy section. There is an assistant chief with a B.Sc. and under him are four technicians in the surgical section and two technicians in the autopsy section.

Cytology has a charge technician and an assistant technician, as does electron microscopy.

This is the most highly specialized laboratory in terms of the interchangeability of the technicians. There is no intersectional rotation. The medical director believes in an intensive on-the-job training for the technicians in each of the sections. Although some of the technicians took a general R.T. before joining the laboratory, most did not. The electron microscopy technicians require a particularly long on-the-job training. More than a year is required to discover whether they will be able to master the job.

Blood Bank

There are two categories of specialized personnel in this unit, intravenous nurses and technicians. The blood bank is supervised by a technical director, who has a secretary and a charge technician. The six intravenous nurses collect the blood

samples, bring them to the blood bank, draw the required blood, and carry out the transfusions. The eleven technicians do the blood typing and cross-matching.

The laboratory has two sections, cross-match and prenatal. The work of the unit is mainly routine; it is not a research department. The technical director would like to do clinical investigation, but there is no space. As it is, he and his charge technician sometimes stay after hours to do this. They also have a person who comes in several nights a week to handle special projects.

The technical director's work is mainly administration and trouble-shooting. The only technical work he does is the aforementioned clinical investigation which may result in a publication. The blood bank operates twenty-four hours a day, but with a skeleton staff (of one) at night. There are three shifts: the first from 8:00 a.m. to 4:30 p.m.; a second smaller one from 1:00 p.m. to 10:00 p.m.; and the night girl from 10:00 p.m. on. The night girl occupies this job permanently, and is relieved by a part-time girl who, nonetheless, works almost a full thirty-seven hour week.

The I.V. nurses are girls with R.N.'s, most of whom have had no experience in blood banking. Their job is to take specimens and start the intravenous process on the patients. They are trained over a two-week period in which they follow an experienced nurse around, watch her, and perform the operations under her direction. The director has the nurses spend one day a week in the laboratory, alternate weeks in each section, partly to make up for the shortage of technical help and partly to provide them with a break and a refresher tour.

Hospital C, Toronto

To all practical purposes, the laboratories here are separate entities. Biochemistry was the first to split off on its own twenty-six years ago. One of the few occasions when the different laboratory directors get together is when they sit as a group to evaluate applications from prospective student technicians. Despite the de facto separation of the laboratories there is a nun who is nominally the administrative officer for the entire operation.

Division of Labour in the Laboratories

Biochemistry

A man with a university degree in chemistry and at least twenty-five years of service is technical director of the biochemistry laboratory. He has an assistant chemist with a university degree from Belgium. There is another professional chemist who works part time on special projects in the laboratory. The rest of the staff consists of eleven technicians, several of whom have R.T.'s, one laboratory assistant, five students, two washers, and two secretaries.

The part-time chemist specializes in chromatography, in "thin layer" and in lipids research. She also works in the clinical investigation unit part of the time.

The chief technician helps out in the routine tests as well as handling some administrative and teaching chores. The technicians collect their own blood samples and sometimes samples for the haematology department as well. One technician works at each of the eight benches in the laboratory where different tasks are performed. They rotate to a different bench every six weeks. These benches comprise the BUN and sugar tests (autoanalyser); the electrolyte tests; the alkaline and phosphates, and albumin tests; the bilirubins and cholesterols; the transamitose and magnesium tests; urinalysis and stool tests, fluid balance and stool fats tests; the protein bound iodines, calcium and phosphorus tests. One of the technicians works full time on steroids without rotating.

The two secretaries type the list of tests to be done on a master sheet and type in the results after the tests have been completed. The laboratory assistants perform the simpler routine operations, as do the students. One of the assistants splits the blood when it comes into the receiving room. The students work under close supervision from the chemists, the chief technician and the senior technicians. A unique feature of the technician's job in this laboratory is the recording of the results on the patient's chart at the end of each day. This practice is followed for reasons of speed and accuracy.

Bacteriology

There is one doctor in charge of both the bacteriology department and the blood bank. In the bacteriology department his charge technician is a girl with an M.Sc. degree. She is really the director's assistant and does not participate in the routine work of the laboratory. She does the special work that the director requests her to do. She also trains new employees.

One of the regular technicians works full time on the blood cultures bench. The remaining five technicians do the routine work, rotating around the different sections of the laboratory every month. The department also has two media-makers; they are not technicians but are classed as laboratory assistants. One of these is extremely competent and could be relied on to do any of the laboratory work. In order to get her a salary commensurate with her ability she is called a "technician in training". In addition to these people, the bacteriology laboratory has a university student who "lives in" the year round. His job is to "clean the cupboard" every night of specimens which come in after the regular working day is over. This job takes him anywhere from twenty minutes to half an hour each night. For this he gets free room and board.

The five technicians take turns working on the "setting up", swabs and T.B.

cultures, urine, and stool and miscellaneous sensitivities benches. The laboratory also has a secretary and a female clerk who records each test. They share six dishwashers with the pathology department.

Blood Bank

This has two parts: the blood bank proper with a supervisor and three technicians, and the intravenous team — a senior nurse and three other nurses.

The technicians do routine typing, cross-matching and prenatal work. Although this type of work is not highly complex, it requires much careful, concentrated effort, for there are many points at which a serious mistake can be made. It is essential to recheck names, numbers and requisitions in order to make sure that the patient receives the right blood. Very little machinery is involved in this work; the centrifuge and the microscope are the most complex equipment in the laboratory.

The intravenous team has its own small room near the blood bank but spends most of its time on the wards. These nurses start transfusions, collect blood specimens and give other intravenous medications. They are under the joint supervision of the medical director of the blood bank and the department of nursing.

They make rounds on the wards three times a day. In the afternoon they go to the operating room and obtain the list of the next day's surgical patients from whom they collect samples for cross-matching.

Haematology

This unit has a medical director, a chief technician, seven other technicians and a secretary. The staff usually includes one or two student technicians who spend three months of their practical training in haematology.

There are two specialized sections in the laboratory, each with a permanent technician who does not rotate. One does the blood coagulation tests and the other the haemoglobin athalacemia tests. Until recently there was another technician who worked full time on the amino tests.

Aside from these specializations, the rest of the work is routine. The other technicians rotate around the four benches which handle the routine work. These benches include blood smears, on which three technicians work; the counters, on which two work; and the "take-off counts", on which one technician works. The fourth routine job is that of the "float" who helps out where needed, does odd jobs and takes samples from outpatients.

Hospital D, Northern Ontario

The medical directors of these laboratories are two pathologists, one of whom is on the full-time staff of the hospital. An experienced technician is the technical

director of the entire set-up. He has a deputy who helps with administration, allowing the technical director to spend much of his time in planning for expansion. His laboratories comprise the central laboratory office, the blood bank, and the haematology, biochemistry, bacteriology, histology, cytology and medical photography departments. Each laboratory, except medical photography, is staffed by a charge technician and a group of several other technicians. There is no rotation of staff among the different laboratories. Each charge technician reports directly to the technical director.

Size and Composition of the Staff

The complement of each laboratory is as follows. Biochemistry has a charge technician, a senior technician, a technician, a non-registered technician and a student technician. Bacteriology has a charge technician (the technical director), a technician and a student technician. Histology has a charge, a senior, a technician and a student. Haematology has a charge, a technician, a student and two registered nursing assistants. Cytology has a charge technician, a senior technician and an R.N.A. There is one medical photographer with an assistant. The blood bank has a charge, a senior and a student technician. Altogether, a total of twenty-one laboratory technicians were employed full time in this hospital. These included:

1 technical director
1 assistant director
5 charge technicians
4 senior technicians
5 junior technicians
3 registered nursing assistants
1 non-registered technician

Division of Labour in the Laboratories

Biochemistry

There are seven technicians in this unit, four of whom rotate monthly to different benches, two of whom work full time on specialized tasks such as hormone tests, and the head technician. The laboratory performs some sixty different tests, four of which are automated. They have one double autoanalyser.

Histology

The technical director and the junior technician make most of the final identifications. They also teach the student on the job. The student collects specimens from the O.R. and does the initial set-up and labelling work.

Cytology

There is an innovation in staffing in this department and in the haematology department. Cytology has one technically trained R.N.A. on staff and haematology

has two. They were hired in response to an urgent demand for technicians several years ago. Cytology had just introduced the free smear program and its work load mushroomed.

The R.N.A. goes to the floors to obtain the pap smears and prepares the slides. She also looks after any outpatients who come in for tests. In addition she takes all the other smears in the hospital, does much of the paperwork and filing. The technicians screen the slides and report the results. The charge technician alone does the chromosome work.

Haematology

There are two technicians with A.R.T. certificates in this department. There are also two R.N.A.'s. It appears that all the staff except the charge do the same work — go to the wards and collect specimens, prepare the blood for examination and conduct cell counts.

Blood Bank

The only notable feature of the division of labour here is the fact that the student does only routine work under close supervision. The charge and the senior technicians do the more involved tests.

Hospital E, Central Ontario

This hospital presents a sharp contrast to the others in our sample. When it is recalled that a large proportion of general hospitals in the province are of this size or smaller, the findings here take on considerable significance. There were eleven laboratory technicians in this hospital. Of these, one was the chief technician, eight were full technicians and two were assistant technicians.

They now have a full time pathologist in charge of the laboratories, but until three years ago the man in charge was the head technician. Even at present it appears that the pathologist takes direct charge of only the pathology section of the laboratories and leaves the full responsibility for the other fields to the head technician. He communicates closely with the attending physicians on each case.

The pathology section is the only full specialized unit in this laboratory. One technician works full time in this section under the direct supervision of the pathologist. She was formerly a generalist technician who took her turn on all the other facets of the laboratory work, but moved to this job to avoid "on call" duty.

The rest of the technicians are generalists who follow an irregular rotation to the various benches in the laboratory. The head technician orders the rotation only when he feels the technicians are getting rusty in other fields.

The supervision is carried out by the head technician and his charge technician

in biochemistry. They do the final checking in all fields except pathology. They prepare and assess the quality control program in biochemistry and haematology. They make all the final identifications in bacteriology. The head technician confines most of his technical work, however, to biochemistry.

All the other technicians rotate. The need to know all the routines is dictated by the shift and call system. Each week night and during the weekends only one technician is on duty or on call, and she must be familiar with all of the tests.

In addition to this, there are certain clinics which occur at periodic times during which all technicians work together on one task. For instance, early every Wednesday morning there is the tonsil clinic which conducts coagulation tests for the day's preoperative patients.

Roughly, the distribution of technicians among the different departments is as follows: one girl full time in the histo-pathology section; three in haematology and the blood bank (one of whom is an assistant technician who collects blood); four in the biochemistry section; one in bacteriology, with an assistant technician who works as a media-maker and a washer.